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ANNUAL ORATION

SOME RESPONSIBILITIES OF MEDICAL EDUCATION*

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BOSTON

TO DELIVER the Annual Oration of the Massachusetts Medical Society is an honorable privilege, for which I am grateful.

For almost fourteen years, as dean of the Faculty of Medicine, I have had the chief responsibility for the administration of the Harvard Medical School. This experience is the reason for my choice of subject and presumably the basis of the Society's choice of an orator. The organization and progress of medical education have been my chief preoccupation for these fourteen years, and I welcome the opportunity to place on record my faith and my optimism regarding it. As I have contemplated medical schools in general and the Harvard Medical School in particular, I have been asking myself with special insistence: what are these schools for, and what are they trying to accomplish? Even a general answer to these questions could be useful. In the next few weeks I shall leave the dean's office to return to teaching and research, hoping, as one may say, to regain my amateur standing, and so I speak with a particular sense of freedom and entirely for myself, not as a dean, but as a private citizen who has had some experience with these problems.

There are many reasons why it is pleasant to meet in Worcester. One is that it gives an opportunity to look at medical schools from a distance of some forty miles — a circumstance calculated to permit a view of the forest without being lost among the trees.

Members of the medical profession are not apt to consider the Army and the Navy as academic organizations, or to expect them to excel in educational enterprises. Nevertheless, some of the training programs of the armed forces during the war held lessons for formal educational organization. These training programs taught selected young men to fly, to detect submarines, to carry a gun or to speak German in what seemed to many professional educators a surprisingly short period. If one seeks causes for the success of these programs, so far as they were successful, he is apt to conclude that one factor was that the organizers of these programs were able to define with great clarity and simplicity the program's objectives. They were able to say what knowledge, what skills, what habits of mind and muscle they wished the trainee to acquire, and they could eliminate with complete ruthlessness any material, any exercise, any point of view that did not contribute to these specific and limited ends. The organizers of these training programs were not concerned with general education or with a distant future, but with an immediate, limited and definable goal. Moreover, they were able to select their candidates freely and to weed them out without hesitation.

I should be the last to deny that there are many differences between Army or Navy or Air Force training and medical education, but I do submit that medical schools would have better organization and planning if there were clearer understanding and better agreement as to the objectives of the medical school program.

The responsibilities of medical schools, to my mind, may be summarized in six major categories.

Provision of Instruction Leading to the Degree of Doctor of Medicine

When the Harvard Medical School began its work one hundred and sixty-seven years ago, its faculty was mainly concerned with offering instruction to prepare men directly for practice. The faculty of today continues to accept as a primary responsibility the provision of instruction leading to the M.D. degree, a course that is still the basis of an informed and competent profession. As we approach a discussion of this first basic objective, the undergraduate course, we encounter the theme

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of this address, if it can be said to have one. That theme is as follows: a characteristic of twentieth-century medicine is *rapid change* in knowledge and in practice.

In David McCord's* anthology of light verse, there is a composition by Mr. Newman Levy that concerns the characteristically rapid change of modern life. It is entitled "I Wonder What Became of Rand, McNally," and the most relevant verses run thus:

> Mr. Rand and Mr. McNally,
> Arbiters of hill and valley,
> Portraitists of sea and land,
> Mr. McNally and Mr. Rand.
> Two sad cartographic chaps,
> Sat in their office surrounded by maps.
> Globes and maps around the room,
> And on *their* maps a look of gloom.
>
> "Time was when this business of ours was grand,"
> Said Mr. McNally to Mr. Rand,
> "When our toughest job was to sit and think
> Shall France be purple and Britain pink?
> Shall Spain be tinted a bright cerise,
> And perhaps a dash of green for Greece?"
>
> "But that," said Rand to Mr. McNally,
> "Was before Benito got rough with Hallie,
> When we didn't fret about changing borders,
> And we just sat here receiving orders."
>
> "Remember those days," McNally said,
> "When we'd plan a map a month ahead,
> And we'd know, if it came out at noon, let's say,
> It was up to date the entire day?"
>
> "Those days," said Rand, "are gone *totally*."
> "You said it, brother," said Mr. McNally.

The changes of the recent past have multiplied the variety of careers in medicine. Those equipped with medical training may translate it into the practice of surgery or of psychiatry, into general practice or that of ophthalmology. They may go into research and work with methods as diverse as those of nuclear physics, of statistics and of psychoanalysis. They may go into teaching, or into hospital or medical-school administration. The basic course, then, must *be* a basic course, not aimed simply or singly at preparing men for any one of these careers, but qualified to serve as a foundation for all. It must do better than this; it must serve as a foundation for types of careers that are still unknown but that will surely evolve in the years ahead.

A suitable plan of instruction, in a changing world, is concerned with developing in students not only knowledge of facts, not only good ways of using facts, but in particular, and at all possible times, providing a basis for understanding facts. Medicine should be taught, so far as our knowledge permits, in terms of the mechanisms of the phenomena of health and disease, thinking all the time about "why" and seeking always (to borrow a phrase from that rich source of memorable phrases, Mr. Winston Churchill) "the unique and inexorable sequence of cause and effect."

Teaching based on this principle is often successful and stimulating; one is tempted to think that emphasis on mechanisms and sequences is perhaps the chief merit of modern medical education. There is another point in favor of this philosophy. If one believes that a chief function of what we may agree to call undergraduate medical education is to establish a basis for the continuing self-education of graduates; then emphasis on understanding is of central importance. The war was a testing ground for men and for methods of education. Many colleagues, on the basis of their war experience, have brought forcibly to my attention two attributes of the young physicians who during the war were best able to adapt themselves to unfamiliar varieties of medical activity. Let us remember that these unfamiliar varieties of medical activity were carried on under unfamiliar and difficult circumstances and by unfamiliar methods. These attributes of professional success were, first, stability and integrity of character, and, second, a good basic understanding of disease in terms of pathology, physiology, immunology, psychobiology and the other general formulations that underlie our understanding of the interactions of man and his complex and changing environment. Such attributes permit a young man to adjust himself to the unfamiliar tasks of military medicine and permit him to adapt himself to and utilize the changes brought about by the advance of knowledge.

I conclude that a major objective of medical schools is to provide the M.D. candidate with educational opportunity planned to let him acquire an understanding of the mechanism and the natural history of man and his diseases. The degree is not a certification of fitness for practice; it is a certification of basic medical training — the decision of readiness for practice is another. In the United States the several states reserve to themselves the right to say when a physician is ready and suitable to practice his profession.

So much for this indispensable objective and duty of medical schools in training physicians for participation in the medicine of the future by the provision of instruction leading to the ancient and worthy degree of Doctor of Medicine.

Provision of Instruction Leading to the Degree of Doctor of Philosophy in one of the Medical Sciences

There is an over-all shortage of physicians. This assertion is the subject of general agreement although no two people are agreed about the degree of the shortage. But, however severe this shortage is, there is another shortage even more severe: that of teachers and investigators in the fields of the "medical" sciences such as physiology, biochemistry, pharmacology, pathology and bacteriology. The

*McCord, D. T. W. *What Cheer: An anthology of American and British humorous and witty verse gathered, sifted and salted.* 515 pp. New York: Coward-McCann, Inc., 1945.

explosive expansion of knowledge in these areas and the growth of research in universities, institutes, hospitals, Government departments and industry create a demand for competent scientists in these fields that is simply not being met.

Medical schools are now facing, more clearly than before, their share of responsibility for the basic training of these indispensable people. Adequate provision for training the successors to the present generation of such scientists is a part of the duty of universities and medical schools and one of the methods for expanding total medical personnel. Harvard University attempts to meet the problems by an ingenious collaboration between the preclinical departments of the Medical School, on the one hand, and the Faculty of Arts and Sciences on the other — a strong and useful combination called the Division of Medical Sciences. Before the war there were some 10 men a year in training as Ph.D. candidates in this division. This year there are 50 — an example of a fivefold expansion of one part of the program of medical education. If medical schools do not accept their share of responsibility for training successors to the leaders of the medical sciences, teaching will suffer and the broad and expanding program of medical research will be restricted and injured.

Advancement of Knowledge by Research

The advancement of knowledge is a fundamental university objective, and a major responsibility of medical schools. These schools are in a position of peculiar advantage, standing as they do between the science departments of the university on the one hand and the great teaching hospitals on the other. The research armies of a medical school can make their attack on a wide front and have the enormous advantages of diverse talents and an integrated program. Medical schools, in my opinion (by some considered a prejudiced one), have in the long run great advantages over other forms of organization for medical research, such as research institutes and hospitals. The special advantages of medical schools as research centers include the favoring presence of students and the possibility of a broad, well based spectrum of research running from the infrared of the bedside to the ultraviolet of the basic sciences in the university. It is my conviction that research is not only an opportunity but also a duty of medical schools and that its spirit and performance should be expected of each professor (in varying kind and degree) and of every department. I am equally concerned that teaching (of varying kind and degree) should be expected of every professor and every department. The integration, the mutual stimulation of teaching and research is the most healthful exercise undertaken by individuals or departments. There is no fundamental schism between research and teaching, or between different kinds of research.

In a recent valuable report of the "Medical Curriculum Committee of the British Medical Association" (under the distinguished chairmanship of Professor Henry Cohen of the University of Liverpool) the following wise sentences occur:

> Claims of precedence or rivalry between clinician and laboratory researcher are falsely based and senseless; in Medicine, one cannot exist without the other; each must contribute his quota to the ultimate objective — the promotion of health, the relief of suffering and the elimination of disease in man. The scientific outlook and the humane approach in Medicine are complementary.

Research as an essential function of medical schools needs no defense: it advances knowledge, it helps all teaching, and it is indispensable to advanced training.

No one is going to quarrel very violently with the ideas expressed that training for the M.D. degree, training for the Ph.D. degree in medical sciences and research over a wide front are primary and pressing objectives of medical schools. Controversy, uncertainty and lack of knowledge are much more apparent when we come to consider the next objective.

Provision of Opportunity for Advanced Training for Practice, Teaching and Research

What are the varieties of advanced training that may concern medical schools? Let me illustrate by describing the situation as I see it in the Harvard Medical School at the moment. There are at least three groups of individuals to whose advanced training the medical school has some relation. First, there are about 175 students classified as research fellows. This long list includes doctors of medicine and doctors of philosophy in various medical sciences. They are learning by doing in the field of research and to some degree in the field of teaching. They participate in the work of research teams as a means of equipping themselves to do research on their own. It is from this kind of group that many of the teachers and investigators of the next generation will come. Medical schools clearly have a primary responsibility for providing opportunity to these men. It is a logical place for such work to be located because teachers and investigators in the medical sciences require experience in departments of medical sciences, and these exist, on the whole, in medical schools. It is equally important, to my mind, that the growth of investigators in clinical fields should also be centralized in medical schools because I believe that the evidence of the last twenty years indicates that the clinical investigators of this generation are not able, by themselves, to train the clinical investigators of the next generation, but that the evolution of these investigators, if they are to be effective, requires the help of medical-science departments of medical schools.

The second group is also a large one, less precisely related to the medical school, but clearly influenced

by many members of its faculty. This is the group receiving advanced training for practice, including house officers in the hospitals in which Harvard Medical School teaching is done, and also those who attend the so-called "courses for graduates." This is the field in which the least clarity regarding the role of the medical school exists. Obviously, medical schools cannot be responsible for all or even a large part of advanced training for practice, so that this is peculiarly an area in which definition of objectives and roles of different organizations is urgently needed.

The situation is made more of an emergency by the rapid development of specialty boards and the expansion of their requirements. To my mind, a particular danger threatens advanced training of these types. It is in danger of becoming stereotyped by over-organization, and so becoming preparation for the medicine of today or even yesterday, rather than for the medicine of tomorrow. This danger threatens M.D.'s (in training for practice, teaching and research in medicine) more than it does Ph.D.'s (in training for similar work in the medical sciences).

A point of view relating to this problem may be described in terms of the following case history:

Among the figures that stand out in the great army of men who have contributed to our knowledge of heart disease is the slender silhouette of James Hope. James Hope was born at Stockport in the county of Cheshire, England, on February 23, 1801. The grammar school at Macclesfield having given him what it could, he determined on a career in the law. Before he embarked on this course, however, he went into the Yeomanry Lancers (at the age of eighteen) and spent a year in military service, or something approaching it. At the age of nineteen he began the study of medicine at the University of Edinburgh. His medical-school career was somewhat irregular, since he left the school before the end of his final year to take an excellent hospital post that offered itself at that time. He took this job with the blessing of the faculty and returned in 1825 to present his thesis and to take his degree. At the time of his graduation, Hope was twenty-four years old, intelligent, able, ambitious and possessed in a high degree of a most valuable characteristic, the habit of effective and unremitting industry.

As a medical student he had paid particular attention to pathological anatomy and to pathological physiology, believing those subjects to be the basis of intelligent practice. He had developed a native talent for drawing to great facility in medical illustration and had already begun the collection of drawings of specimens obtained at autopsy that were to be used in his own books later on. He proposed as his own goal to be a highly competent internist, with special interest and skill in the field of cardiovascular disease, and he set out to train himself to be the kind of person he wanted to be. First, he took a dressership at St. Bartholomew's Hospital because he was convinced by his own observations that medical people did not know enough about surgery. This was followed by a year in Paris in the exciting atmosphere of the great French clinical school. He reached Paris in 1826. Laennec had just died (of tuberculosis), but Chomel was professor of clinical medicine at La Charité, and working with him were Andral, Louis and other stimulating teachers. Hope spent a month acquiring facility in speaking and understanding French and then went to work in ward and autopsy room. He labored not only to learn and to understand but also to perfect himself in the newer technics of physical diagnosis. No doubt some of his colleagues thought his diligence wasted, since many of these technics were so new that there was no general agreement about their future importance in the practice of medicine. After this year of rich clinical experience in France, he worked systematically for another year in the hospitals of Italy, Bavaria and Holland. At twenty-seven he was, as he had set out to be, a well trained internist with a broad clinical experience and with a special competence in the field of his interest. He knew the literature, he knew the men, he knew the subject. He was skilled in the technical aspects of the field and had had some exposure to the methods of thought and the methods of procedure of experimental medicine. He began his practice. At thirty he published a treatise entitled "The Diseases of the Heart and Great Vessels" — a book that Dr. Herrick, in his short *History of Cardiology*, says, "Outclassed all other books on the subject that had then been published." Dr. Herrick goes on to say further:

> Hope struck a new note in the literature of heart disease. His volume has a modern ring to it. His discussion of the anatomy and physiology of the heart, heart murmurs and other physical signs is thorough and scientific with conclusions drawn from a study of the writings of others, as well as from his own experimental and clinical observations.

Hope's book had a deserved success. He influenced the practice of medicine in England, in Continental Europe and in America. My conclusion is that in spite of his untimely death from tuberculosis at the age of forty James Hope made important contributions to our knowledge of medicine and to its translation into practice. I do not suggest that he be taken as a complete model for young men in medicine. He was able and useful, but he had defects of character that made his ultimate stature less than it might otherwise have been. He was egocentric, jealous and hypersensitive, and neither generous nor fair in controversy. But in spite of these limitations of character it seems reasonable to conclude that his plan for the advanced training of James Hope was a successful one.

We may ask ourselves, "What is the essence of his plan of graduate education?" It is, I think, quite simple. First, he assumed the responsibility for planning and carrying out the program of his own continuing education. Second, he defined his goal. He drew the specifications of the kind of life he wished to have and the kind of doctor he wished to be. Third, he systematically, patiently and industriously acquired the skills, the knowledge, the judgment based on experience that made it possible for him to be that kind of doctor. In general, that is the way I think advanced training should be managed, with a minimum of specification from schools or boards and with a maximum of individual responsibility.

Participation in Community Services, in the Provision of Medical Care, Prevention of Disease and Education of the Public.

The medical school as compared with other parts of universities stands in a special relation to the larger community. An important part of the teaching in the medical school is carried on by university appointees working in hospitals and by the participation of both teachers and students in the actual work of community service institutions, such as hospitals. As a part of its university function, therefore, the medical school actually takes part in the provision of community service. In the provision of such service, university personnel and university organization have certain special obligations. One is to see that the community services in which the university participates attain a quality that the university is willing to see accepted as an example of standards of performance that medical students may follow. In medical care, for example, medical-school teachers must set an example not only of technical competence but also of humanity, of the treatment of the whole person, of the utilization of community resources, of the recognition of environmental factors and of all the varieties of professional responsibility. When such an example is set, the medical school is serving the cause of education, is assisting the hospitals and is helping the community.

Recruitment and Selection of Medical Personnel

So far we have considered the objectives of the medical school as they relate to the basic instruction of prospective physicians, leaders in the medical sciences, teachers and investigators, the responsibilities of the medical schools as centers for the creation of new knowledge and its relation to community activity. There is another responsibility that needs to be discussed and that in some ways is fundamental to all the rest. It is this: in general, medical schools are responsible for the *recruitment* and *selection* of the individuals who will make up the medical profession of the next generation. They play the role of the guardians of the gate, of St. Peter or of Cerberus, according to one's point of view. Obviously, the quality of the group so admitted to the profession depends upon two major factors: first, what individuals apply to medical schools for admission, and, second, what individuals are selected from the applying group?

In the past, most of the thought and time of faculties of medical schools have been concerned with the matter of selection. Perhaps it is now time for the faculties, and indeed for the medical profession, to give consideration to the still broader problem of the factors that attract men to the profession of medicine and those that repel them. These recruitment factors are partly the responsibility of medical schools and partly that of the profession at large. The factors that attract men to medicine include such diverse influences as their interest in science or in human beings, the tradition of their families, the romantic attraction of the profession, the prestige of medicine and its opportunities for service, for research and for a life of dignity and community standing. The factors that repel men from medicine include the cost of education, the ever-increasing prolongation of the training and the uncertainty of the future. It is not always recognized that in a changing world the professions that have a long training period are apt to be at a disadvantage so far as recruitment is concerned because it is so difficult to prophesy what the state of the profession will be when the long training has been achieved. At any rate, a systematic study of the factors that lead men to enter or to refrain from entering medicine is an important job for someone to do in the future.

Selection is a perennial problem. No one is satisfied with the methods, and no experienced person is prepared to suggest the ideal procedure. What is sought here, since we are talking about objectives, is a student body made up of individuals who have the intellectual capacity to deal with the prodigiously complicated and a rapidly changing period of medicine, who have the integrity and moral strength that we call character, and who represent wide varieties of talent and interest so that they can play successful roles in the extraordinarily diverse parts of the medical spectrum. To end up with a superior profession requires a wide variety of superior applicants, skillful admission committees, and *freedom to select the best men.*

The recognition of intellectual superiority is easier by formal tests than judgment of character. So far, selection by formula has not been as successful as a combination of statistical material with the judgment of experienced teachers. As has been repeatedly emphasized, they are being selected for general practice, for highly technical specialties such as ophthalmology, for surgery, for psychiatry, for research in fields as diverse as nuclear physics and the unconscious mind, for teaching, for administration, for careers in the sciences underlying medi-

cine and for fields of the future even the identity of which is as yet unknown. It is a nice assignment, and it does not lend itself to solution by a narrow formula.

William James said something to the effect that there is not much difference between one man and another, but that what difference there is turns out to be very important.

In summary, then, it appears that the objectives of medical schools include the following: the provision of instruction leading to the M.D. degree; the provision of instruction leading to the Ph.D. degree in medical sciences; the prosecution of research over a wide spectrum; the provision of advanced training for practice, for research and for teaching; participation in the community service of hospitals and other institutions of medical service; the recruitment and selection of the medical profession of the future.

* * *

In attacking these objectives, schools need the help, the support, the criticism and the understanding of the medical profession. It is a great and happy privilege to be able thus to present my concepts to this important part of our profession, the Massachusetts Medical Society.

THE EFFECT OF THE RICE DIET ON THE LEVEL OF THE BLOOD PRESSURE IN ESSENTIAL HYPERTENSION*

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INTEREST in the influence of diet on the course of hypertension has existed for at least half a century. In 1904, in France, Ambard and Beaujard[1] advocated the use of a low-salt diet for the treatment of hypertension. In the early 1920's in this country Allen and Sherrill[2] and O'Hare and Walker[3] reported on the use of low-salt diets in hypertension. These workers believed that the effect was produced by restriction of the chloride ion. Addison[4] was among the first to suggest that the sodium ion was the important element, and came to the conclusion that "One has forced on one the concept that the prevalence of arterial hypertension on this continent (North America) is in large part due to potash poor diet and an excess use of salt (sodium chloride) as a condiment and preservative of meat." In 1920 Mosenthal[5] discussed the influence of protein foods on the blood pressure, and concluded that restriction of this dietary component had little or no beneficial effect. In 1929 Berger and Fineberg[6] reported on 13 patients on a low-sodium diet, stating that they failed to see any unquestioned blood-pressure modification that they could attribute to sodium restriction. Interest in the dietary treatment of hypertension lagged until 1944, when Kempner[7] reported on the treatment of kidney disease and hypertensive vascular disease with the rice diet. Since that time there has been a renewal of interest. Many workers,[8-11] believing that the most important factor in the rice diet was the restriction of sodium chloride, have used a very low-sodium diet, which has otherwise met the accepted standards of adequacy in other food essentials (National Research Council standards). Kempner's rice and fruit diet has been said to combine practically all the theories that have been advanced for the dietary treatment of hypertension, being low in sodium (200 mg.), low in protein (20 to 25 gm.), low in fat (5 gm.) and restricting fluid intake to 800 to 1000 cc.

One naturally speculates about the rationale of using such a restrictive diet as Kempner's, which violates the accepted pattern of proper nutrition. Kempner[12] says, in a recent publication, "The treatment of hypertensive vascular disease with the rice diet was suggested by observations made on the protein, fat and carbohydrate metabolism of isolated kidney cells under various pathologic conditions (cell injury and/or changes in pH, sodium bicarbonate concentration, oxygen tension, and metabolizable substrate)." Working with damaged kidney tissue, he was led to consider the kidney as an organ of metabolism[13] as well as an excretory organ. He postulated that pathologic conditions in the kidney lead to changes[14] that may be summarized as follows: certain substances that are normally removed by kidney metabolism may be increased in amount, whereas other substances produced by the kidneys may be decreased in amount. These abnormal substances, which accumulate as a result of disturbed kidney metabolism, may be presumed to be harmful, and to be partially responsible, either directly or indirectly, for the production of hypertensive vascular disease. Kempner suggests, therefore, that the ordinary mixed diet may contain constituents that increase the production of these abnormal substances. By reduction of the elements of the diet that must be metabolized by the kidneys, the production of the abnormal substances is presumably reduced. This reasoning, *a priori*, accepts the renal etiology of hypertension. It is known that Kempner[7] first used

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the rice diet in treating hypertension resulting from kidney disease. Later, he extended the use of the diet to the treatment of essential hypertension.[12-14]

The enthusiastic reports of the treatment of essential hypertension with the rice diet by Kempner have stimulated many workers to attempt to evaluate this therapy.[15-18] During the last year, in the Hypertension Clinic of the Massachusetts General Hospital we have used the rice diet as a method of treatment. Our study had been in progress for about nine months at the time this material was collected so that the number of patients is not large, nor is the time elapsed sufficient to form conclusive opinions regarding the influence of this treatment on the course of such a disease as hypertension. We present this primarily as a progress report. In using the rice diet on clinic patients we hoped to determine whether this method of treatment is a practical one for use with ambulatory patients observed once a week while living in their normal surroundings and eating with other members of the family who are on a regular diet, and what clinical results are obtained when the treatment is applied to such a group.

Method

The patients in this study were taken from our regular clinic patients. Many had been followed for a number of years and therefore had a long control period; others were relatively new to the clinic and had a shorter control period. The group included patients with essential hypertension with and without renal involvement, the majority falling into the latter category. All patients were submitted to our routine workup, which includes history, physical examination, routine blood work, urinalysis, electrocardiograms, x-ray study of the chest, examination of the fundi, renal-function tests and determination of blood sodium, chloride, cholesterol, total protein and nonprotein nitrogen.

The patients advised to try the rice diet were seen weekly while on the strict rice diet. Although this made a heavy clinic load it was deemed important to follow the patients closely to pick up any evidence of sodium depletion in patients with poor renal function. Weights were recorded on admission to the clinic. At first each patient received individual instruction from the dietitian on the following diet:

I. *Rice.* Each day 1 cupful of rice, measured before cooking, is used. This yields approximately 4 cupfuls of cooked rice. Brown, polished or white rice may be used. It should be boiled or steamed without salt, milk or fat. (No butter, margarine, drippings, lard, grease or salad oil is used.)

II. *Fruits. Fresh*, raw or cooked fruits are taken. Any fruit with the exception of avocados, dates and nuts may be eaten (no tomatoes). No more than 1 banana a day is taken. *Canned* fruit is allowed, if no preservative has been added (all labels should be inspected, especially the fine print, which may mention artificial flavor or color, sodium benzoate, sulfur dioxide or corn syrup). *Frozen fruits* may also be used.

III. *Sugar.* Sugar is taken as desired (white only). Glucose (dextrose) may be used — it is less sweet and better tolerated by many people. Honey is permitted, but no maple sugar, corn syrup or molasses. Fruit and sugar jams and jellies — if pure — are allowed.

IV. *Fruit juices* Any fresh or canned fruit juice may be used if it contains no artificial flavor, color or preservative. Tomato juice and vegetable juice are not allowed.

V. *Fluids.* Fluids are limited to 3 or 4 cupfuls of fruit juices a day. After the first three or four days, no additional water should be taken.

Special Instructions. The patient is instructed to eat only the foods outlined on the diet and not to drink any tonics, root beer, sodas, gingerale or other carbonated beverages; no beer, ale, wine, whiskey, coffee or tea is permitted.

Later, the patients were seen in a group by the dietitian, and their problems were discussed and new ideas in fixing rice or fruit reported. There was a food display each week aimed at interesting the patients and demonstrating new methods of preparing rice or fruit combinations, using fruits that were currently in season. This produced a group motivation that we considered important in achieving close adherence to an unpalatable diet.

Each patient was seen individually at every visit by one of the doctors, who evaluated the symptoms as well as any physical changes that had occurred. The blood pressure was taken three times at each visit: on entrance, during the interview and just before departure. Modifications in the diet were ordered by the doctors, depending on the response to treatment, or if it became apparent that the patient was growing restive under such a stringent diet, modifications were made regardless of response. An attempt was made to follow Kempner's general plan in modifying the diet by the addition of items in the following order: white potato, low-sodium, nonleguminous vegetables, tea or coffee without milk, white meat of chicken, white fish or lean meat.

Several workers[12-19] have pointed out the importance of careful determination of the blood chemical constituents of patients on very low-sodium diets, especially those of patients with impairment of renal function. Our plan has been to order determinations (including sodium, chloride, cholesterol, nonprotein nitrogen and total protein) before the rice diet was started, and at frequent intervals (two weeks) while the patients were on the strict rice diet. In our experience a careful clinical follow-up study serves as a good protection for the patient. In the group of patients followed, only 1 developed a low serum sodium level (127 milliequiv. per liter) and clinically this was apparent before the laboratory report had been returned.

The frequent determination of twenty-four-hour urinary chloride excretion is important to determine how closely a patient is adhering to the diet. On an average diet the excretion of urinary chlorides

varies from 125 to 175 milliequiv. per liter in twenty-four hours; on the strict rice diet the excretion falls to 10 milliequiv. or below. By use of this determination we separated our patients into the following classes: strict adherents, moderate adherents and delinquents. All patients whose urinary chloride excretion fell to 10 milliequiv. per liter or below on the diet were called strict adherers, whereas those with excretions between 10 and 50 milliequiv. were called moderate adherers, and those with excretions above 50 milliequiv. were called delinquents. The moderate adherers could be rightly thrown out of the study, for this group does not represent patients on the Kempner diet. They do demonstrate, however, a group of patients on a restrictive diet — one that is moderately low in sodium. It seemed of interest, therefore, to follow them so as to compare the results in this group with those obtained in patients on the strict rice diet.

Results

The total number of patients instructed on the rice diet in nine months was fifty-six. Our success in maintaining patients on the diet can be shown by the following figures: strict adherers, 16 (28 per cent); moderate adherers, 20 (36 per cent); and delinquents, 20 (36 per cent). Of the group who adhered strictly to the rice and fruit diet, 10 were men and 6 were women, whereas of the moderate adherers 5 were men and 15 were women. This division apparently points up one of the difficulties met with in treating patients in their normal environment: the women have to prepare the food for the rest of the family and are therefore subjected to greater temptation to deviate from the diet.

In evaluating the clinical results of this study, at present we shall limit ourselves to objective results as manifested by change in blood pressure and change in weight. Evaluation of renal, cardiac and cerebral status will be left until a later report.

What constitutes a significant reduction in blood pressure? This has been a difficult question to answer, and has led us to a review of the literature, where one finds many criteria for evaluating change in blood-pressure levels.[6, 8, 10, 12, 15, 18, 20-22] Table 1 presents a summary of the criteria for evaluating blood-pressure response by different authors. As will be seen some studies are done on hospitalized patients, whereas others are done on ambulatory patients; the number of patients varies from 6 to 500, and the length of time from twenty days to five years. In some studies the blood-pressure response is based on a few records taken at long intervals; in others it is based on many determinations taken frequently over a short time. The control period, when stated, varies from weeks to three

Table 1. *Criteria for Evaluation of Blood-Pressure Response.*

Author	Treatment	Type of Case	No. of Cases	Period of Observation	Method of Evaluating Response
Berger and Fineberg[8]	Effect of different amounts of sodium chloride on hypertension	Inpatient	11	Control, 10 to 14 days; treatment, 39 days.	Trend of blood-pressure curve
Bryant and Blecha[6]	Low-sodium diet; forced fluids.	Outpatient	100	Control period not stated; treatment, weeks to 1 yr.	Blood-pressure fall to 155/95; diastolic fall to 95 or below.
Fishberg[20]	Sympathectomy	Outpatient	119	Control, months to years; treatment, 4 to 6 yr.	Diastolic pressure 25 per cent below preoperative level; systolic 25 per cent below preoperative level; blood-pressure fall to 150/100 or less.
Flipse and Flipse[15]	Rice diet	Outpatient	54	Control period not stated; treatment, 3 to 50 wk.	Decrease in mean arterial pressure of 20; fall of diastolic pressure to normal; increase in blood pressure more than 20/10 on modification of diet (uncontrolled).
Grollman et al.[10]	Low-sodium diet	Inpatient	6	Control, 2 wk.; treatment 57 to 129 days.	Evaluation of blood-pressure chart; improvement equals drop to normal.
Kempner[18]	Rice diet	Inpatient and outpatient	500	Control 2 wk.; treatment 2 to 6 mo.	Improvement equals decrease of 20 in mean arterial pressure
Fanson et al.[21]	Potassium sulfocyanate	Outpatient	100	Control, 1 to 3 mo.; treatment, months to 4 yr.	Improvement equals fall of blood pressure to 150/100; sustained drop of systolic pressure of 30–50; sustained drop of diastolic pressure of 20–30.
Contratto and Rogers[12]	Rice diet	Outpatient	55	Control 3 yr.; treatment, 6 mo.	Decrease in blood pressure to 150/100; systolic drop of 50; diastolic drop of 20.
Smithwick[22]	Sympathectomy	Outpatient	439	Control period not stated; treatment, 1 to 5 yr.	7 categories (1-2-3 — improvement, 4-5 — unchanged, 6-7 — failure): 1 — decrease in diastolic pressure of 20 or below 90; 2 — decrease in diastolic pressure of 20, but not below 90; 3 — decrease in diastolic pressure of less than 20 to no change, pulse pressure narrowed, ceiling levels lowered; 4 — diastolic and pulse pressure unchanged, ceiling lowered; 5 — no change in blood pressure; 6 — blood pressure higher; 7 — deaths.

years. It seems important for various workers to decide on criteria to be used in the evaluation of blood-pressure response so that communication of results in treatment will be facilitated.

The method we have used in evaluating blood-pressure response is to list all pretreatment clinic control periods, the number of weeks on the diet and weight change.

In a sense the success or failure of any method of treating hypertension can only be assessed adequately after the last patient in the group dies. Only at that time does the complete influence of

TABLE 2. *Results of Rice Diet among Strict Adherers.*

PATIENT	CONTROL PERIOD	INTERVAL ON DIET	BLOOD PRESSURE				ARTERIAL TENSION*			
			MEDIAN PRE-DIET	MEDIAN POST-DIET	CHANGE		PRE-DIET	POST-DIET	CHANGE	CHANGE IN WEIGHT
		wk.			*systolic*	*diastolic*				*kg.*
G. A.	10 yr.	21	212/135	170/118	42	17	171	144	27	−3.8
E. B.	8 yr.	4	180/105	155/100	25	5	142	126	16	−3.1
S. B.	7 yr.	10	190/120	150/118	10	2	155	147	8	−3.5
W. DeS. ...	8 mo.	23	170/110	140/100	30	10	136	119	17	−8.0
E. J.	12 mo.	21	212/133	190/120	22	13	177	154	23	−4.1
J. K.	3 mo.	22	170/100	140/100	30	0	139	119	20	−9.6
W. K.	7 mo.	13	204/120	180/120	24	0	162	150	12	+1.8
N. Mc.	8 yr.	23	205/130	170/108	35	22	168	138	30	−3.6
C. N.	5 mo.	17	220/130	186/100	34	30	181	145	36	−5.4
D. P.	6 wk.	10	215/110	190/100	25	10	165	147	18	−7.1
A. S.	3 mo.	21	215/110	190/106	25	4	165	148	15	−1.7
T. S.	3 yr.	10	230/130	170/104	60	26	168	139	29	−6.9
D. S.	6 yr.	54	199/113	169/95	30	18	157	130	27	−3.5
V. V.	7 yr.	3	190/132	130/96	60	26	192	147	45	−6.5
J. W.	20 mo.	13	240/150	180/120	60	30	192	147	45	−2.5
P. Z.	25 mo.	18	230/130	200/110	30	20	179	156	23	−4.9

*Kempner method (systolic plus diastolic pressure divided by 2 = mean).

blood pressures of a particular patient in numerical order, choosing the median and repeating this on the records taken during and after treatment. This method was used in an effort to eradicate the usual fluctuations due to emotional disturbances and other factors that one sees when blood-pressure determinations are made over a long period. If there

treatment on the natural course of hypertension become evident. It is to be hoped that we can report on the same group of patients again at a later date when the influence or lack of it becomes more apparent. At present, to indicate an improvement we have chosen a reduction of 20 in the median diastolic pressure. On this basis 6 out of 16 pa-

TABLE 3. *Results of Rice Diet among Moderate Adherers.*

PATIENT	CONTROL PERIOD	INTERVAL ON DIET	BLOOD PRESSURE				ARTERIAL TENSION*			
			MEDIAN PRE-DIET	MEDIAN POST-DIET	CHANGE		PRE-DIET	POST-DIET	CHANGE	CHANGE IN WEIGHT
		wk.			*systolic*	*diastolic*				*kg.*
A. A.	16 mo.	9	210/100	190/90	20	10	155	139	16	−4.7
C. B.	13 mo.	10	190/118	170/106	20	12	155	142	13	−2.3
P. B.	5 yr.	32	220/120	177/106	43	14	167	142	25	−2.7
O. C.	7 mo.	15	202/128	200/120	2	8	168	160	8	+2.1
N. C.	7 mo.	19	200/108	180/96	20	12	151	135	16	None
H. E.	2 mo.	17	250/130	200/108	50	22	187	153	34	−0.7
J. F.	3 mo.	3	221/122	220/123	−1	+1	175	171	4	−4.9
G. F.	4 yr.	3	192/120	193/110	+1	−10	158	148	10	−4.6
M. H.	49 mo.	27	200/120	180/110	20	10	169	141	28	−2.0
O. J.	6 yr.	4	175/130	141/110	34	20	156	126	30	−7.7
K. Mc.	5 mo.	22	182/117	170/110	12	7	156	138	18	−4.4
M. Mc.	28 mo.	8	234/126	180/120	54	6	179	158	21	−3.1
T. Mc.	5 yr.	19	216/132	180/130	36	2	174	155	19	−3.6
M. M.	18 mo.	3	210/120	200/130	10	+10	166	164	2	−0.7
L. M.	26 mo.	11	200/120	150/100	50	20	152	129	23	−3.0
M. R.	6 yr.	5	252/126	180/110	72	16	187	150	37	−2.1
T. S.	18 mo.	15	161/111	142/94	19	17	133	123	10	+1.3
P. S.	9 mo.	7	190/110	137/92	53	18	153	117	36	−1.9
D. W.	2 mo.	34	215/140	223/130	8	10	177	179	2	−4.3
C. W.	6 yr.	9	185/105	160/95	25	10	151	127	24	−5.7

*Kempner method (systolic plus diastolic pressure divided by 2 = mean).

has been a sustained change, it is evident, but the peaks and hollows are ironed out. In tabulating our results (Table 2 and 3) we have used the method described. For comparison we have applied Kempner's[12] method of evaluating blood-pressure change to our cases. We have included in the table the

tients, or 37 per cent of those who stayed strictly on the rice diet, showed an improvement in blood pressure. When Kempner's method was applied to this group, 10 out of 16 patients, or 62 per cent, revealed an improvement in blood pressure. In the group of patients whom we termed moderate

adherers, 3 out of 20, or 15 per cent, demonstrated improvement, whereas by Kempner's criterion 9 of 20, or 45 per cent, would be considered improved. On the other hand, if a drop of blood pressure to 150 systolic, 100 diastolic, was used as a sign of improvement, as several workers have done,[18, 20, 21] 4 of 16, or 25 per cent, in the strict group showed improvement whereas 4 of 20, or 20 per cent, in the moderate group showed improvement. As can be seen from this comparison the number of patients who show improvement in blood pressure on any one type of treatment is dependent on the criteria used for evaluating the improvement. When all is said and done we have no way of knowing at present whether reduction in blood pressure constitutes an improvement in the hypertensive state.

Correlation of weight reduction to change in blood pressure has long interested clinicians. No valid conclusion can be drawn from such a small group. If, however, we consider a loss of 4.5 kg., or 10 lb., as a significant weight change, 7 out of 16 strict adherers showed a significant change. Of this number 4 demonstrated a diastolic drop of 20 or more. Of 20 moderate adherers, 5 showed a significant weight change, and only 1 of the 5 showed an improvement in blood pressure.

The other criteria ordinarily used in the evaluation of improvement in the hypertensive state, such as change in electrocardiogram, heart size on x-ray study, fundal vessels and renal-function tests, have not been analyzed for this report. A rapid survey indicates that little change has taken place in the various areas as manifested by these tests.

Conclusions

The rice diet has been used in the treatment of a group of outpatients living at home in their normal environment. The method can be used with safety so long as the patients are carefully followed at frequent intervals.

A significant drop in blood pressure occurred in 6 of 16 patients, or 37 per cent, who adhered strictly to the diet, and in the group of moderate adherers a significant drop occurred in 3 of 20 patients, or 15 per cent.

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ASPIRATION OF THE ELBOW JOINT IN THE TREATMENT OF FRACTURES OF THE HEAD OF THE RADIUS*

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BOSTON

IN RECENT years there has been a revival of the principle of early active motion in the treatment of elbow fractures, first expounded by Jean Pierre David[1] in 1779 and vigorously restated a century later by Lucas-Championnière.[2] For fractures of the radial head in particular this concept appears to be well accepted. In general, these fractures fall into three groups: those in which the fragments are so comminuted or displaced as to require arthrotomy; those in which the fragments are displaced, motion is limited, and arthrotomy is contemplated; and those in which impaction and displacement are minimal.

For the first group, prompt excision of the radial head followed by early active motion is indicated.

FIGURE 1. *Depressed, Displaced, Wedge-Shaped Fracture of the Radial Head (Case 1).*

There was normal elbow motion after aspiration of 11 cc. of thick, bloody fluid.

For the second and third groups, minimal immobilization results in rapid restoration of function and a low incidence of subsequent myositis ossificans traumatica.[3]

Active motion, however, although easy to prescribe, is often difficult for the patient to achieve. Relief of pain and marked increase in range of motion very often follow aspiration of the joint. The literature contains several pleas for early active motion,[3-8] but little note has been taken of aspiration in treatment other than the descriptions of Postlethwait,[9] Jacobs and Kernodle[10] and Buffington[11] of its use in fractures of the radial head in soldiers.

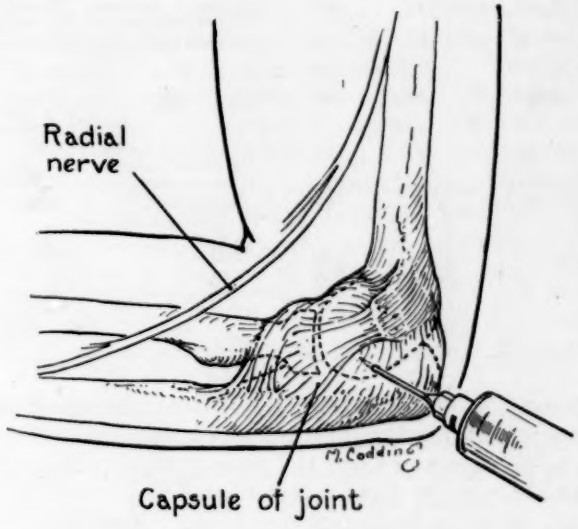

FIGURE 2. *Technic of Aspiration.*

With the forearm pronated, after infiltration with procaine, a 16-gauge needle is introduced into the center of the triangle formed by the head of the radius, the lateral epicondyle of the humerus and the tip of the olecranon.

The following case is typical of the second group of fractures — those with limitation of motion and moderate displacement of the fragments:

C. W., a 42-year-old housewife, was first seen 48 hours after a fall down a flight of stone steps on her outstretched left arm. Active and passive flexion and extension at the elbow were limited to the middle third of the normal range, as was rotation of the forearm. X-ray examination disclosed a depressed, displaced wedge-shaped fracture of the anterolateral aspect of the head of the radius (Fig. 1).

Arthrotomy was contemplated because of the size and shape of the fragment, which, it was believed, was acting as a mechanical block to rotation. However, after aspiration of 11 cc. of thick, bloody fluid, active and passive flexion, extension and rotation were normal. Active exercises were started, and 2 months later function of the two elbows was indistinguishable.

Aspiration is not carried out for at least 24 hours after the injury, lest the hemarthrosis recur. The technic is simple (Fig. 2). However, no aspiration of a joint should be undertaken casually as an office procedure. The resistance of joints to infection is low, and no antibiotic can take the place of a clean operating room, meticulous skin disinfection and rubber gloves.

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With the forearm pronated to minimize the possibility of injury to the deep branch of the radial nerve,[12] and after infiltration with procaine, a 16-gauge needle is introduced into the joint through the center of the triangle formed by the head of the radius, the tip of the olecranon and the lateral epicondyle of the humerus. Often, bloody fluid under considerable pressure is encountered. This is to be expected since the normal fluid content of the adult elbow joint is less than 1 cc.,[13] and more than 10 cc. is frequently recovered. Aspiration in this group of fractures does not take the place of arthrotomy and excision of the radial head when indicated. The persistence after aspiration of limitation of motion or palpable grating on passive rotation is an indication for operation. Arthrotomy should not be delayed, and the decision can almost invariably be made at the time of aspiration.

Rapid return of function after aspiration in the third group of fractures, those with minimal impaction or displacement, is illustrated by the following case:

G. K., a 40-year-old brakeman, tripped over a rail, striking his right elbow. When he was first seen, 4 days later, flexion and extension of the elbow were limited to 30°, and rotation of the forearm to 15°. X-ray examination disclosed a fracture of the radial head with minimal displacement (Fig. 3). After aspiration of 14 cc. of thick, bloody fluid, the range of active motion of the elbow was normal and painless. The patient returned to work 12 days after the injury and 8 days after aspiration.

TABLE 1. *Results of Aspiration in Treatment of 7 Cases of Fracture of the Head of the Radius.*

PATIENT	SEX	AGE	TYPE OF FRACTURE	MOTION BEFORE ASPIRATION	AMOUNT OF FLUID ASPIRATED	RESULT
		yr.			*cc.*	
J. J. S.	M	49	Comminuted, impacted but not deformed	Patient "unable to move without pain"	15	Immediate full range of motion; function normal 4 days later.
W. D.	M	16	No displacement	Rotation normal; flexion and extension limited to 15°.	5	Patient immediately able to extend and flex to 45°; rotation normal; function normal 2 mo. later.
J. K.	F	46	No displacement	Flexion and extension "very limited"; normal rotation.	10	Immediate improvement; function normal 2 mo. later.
V. A.	F	37	Downward depression and slight impaction of lateral aspect	"Elbow moves only between 90° and 140°"; rotation, 10°.	10	Immediate return to 50°–175°; function normal 6 wk. later except for 10° loss of pronation.
A. M. C.	F	61	No displacement	"Motion greatly limited"	15	Immediate return to 150°–80° with normal rotation; normal function 3 mo. later.
G. K.	M	40	No displacement	"Marked limitation of motion and pain"	14	Immediate normal range of motion; function normal 2 wk. later.
M. W.	F	42	Wedge-shaped displacement	Flexion, extension and rotation limited to middle third of normal range	11	Immediate free range of painless motion; function normal 2 mo. later.

FIGURE 3. *Fracture of the Radial Head with Minimal Displacement (Case 2).*

There was normal elbow motion after aspiration of 14 cc. of thick, bloody fluid.

The results in 7 consecutive cases treated at the Peter Bent Brigham Hospital are summarized in Table 1.

SUMMARY

Attention is called to the usefulness of aspiration of the elbow joint in the treatment of undisplaced fractures of the radial head, and also in clarifying the indications for arthrotomy in fractures with moderate displacement.

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BOSTON MEDICAL LIBRARY

Report of the Librarian*

IT IS again the duty of the Librarian, as provided by the by-laws, to present to the Corporation of the Boston Medical Library his annual report — his eleventh accounting of the state of the Library since he took office in 1938. In growth, service to its readers, quality of accessions and increase in personnel, the Library had in 1948 the most profitable year in the seventy-three years since it was organized in 1875. More books and journals were used by readers in the past year than ever before: 10,000 more than in 1947, the year of largest use up to 1948. As the attendance in Holmes Hall did not exceed the average of the last decade, this use came largely through the growth of inter-library loans to nonmembers and, more particularly, by way of professional members — libraries in hospitals and medical schools who borrow for our own fellows and for nonfellows as well.

The total membership of the Library remained practically unchanged at a little over 1100. The increased use of the Library presumably came from the 5671 Massachusetts Medical Society members who, using our books in hospital libraries and elsewhere, solved their medicoliterary problems. It makes little difference where our books and journals are used — in hospital, laboratory or home — as long as they fill the needs of some doctor for the printed record of his contemporaries or those who have gone before. The Library has one primary aim — service to all. In supplying the needs of a growing body of physicians and scientists, the Library grows also — in size, in quality, in resources and in availability. Use is the best barometer of worthiness; on that score we can report a rising glass.

On December 31, 1948, the books and volumes of periodicals in the Library were 206,564 and, in addition, 147,144 pamphlets were catalogued and available for use. The circulation during the year was 53,518 items; the attendance 10,089. The interlibrary loans to nonmembers had grown to 1798 — all figures far in excess of those for 1947 and showing a healthy increase in all departments.

The Usable Past

Only by a knowledge of the usable past can one evaluate the foreseeable future. To the Librarian the past is all printed material, even the latest number of a current periodical. The immediate past is naturally the primary test, since the Library aims to provide for its fellows, the Massachusetts Medical Society members and the public all the printed records of contemporary research that are likely to be called for by clinicians and students. Secondarily, we try to make available in a reasonable time other material that we do not possess, taking advantage of our neighborhood libraries, the great repositories of Harvard University and the Massachusetts Institute of Technology, as well as many others that go, with ours, to make up the cultural heritage of Greater Boston.

In the older literature of medicine, I need not remind you, we are rich indeed. To the great works of the past we constantly add — in 1948 we acquired three unique manuscripts and eighteen books of medical interest printed before 1501. Among the incunabula are some of considerable interest, reflecting fifteenth-century medicine as it was recorded in the early days of printing with movable type. Another edition of the works of Michele Savonarola was added to the two acquired in 1947. We now lack only two of this author's publications in our incunabula holdings, having ten of the dozen issued before 1501.

Accessions

Incunabula

Two early tracts on syphilis were acquired in 1948: Johannes Widmann's *De pustulis, sive mal de franzos* (Strassburg, 1497), and Gaspar Torrella's *Dialogus de dolore cum tractatu de ulceribus in pudendagra* (Rome, 1500). The Library has some of the most important of the syphilis literature of the fifteenth century, including Schellig (1495), two tracts by Grünpeck (1496, 1497) and Leoniceno (1497). We lack the first editions of both of the Grünpeck books, and the tracts by Torrella, Gilino, Stäber, Montesauro and Scanaroli. Some are only known in a few copies and may never come into the market. Of the ten that were produced in facsimile by Sudhoff and Singer in 1925, the Library has three. The list, with the Klebs numbers, is shown in Table 1.

Hans Widmann, born in 1440, studied medicine in Italy but took his degree in Freiburg in 1474. After 1484 he was professor of medicine at Tübingen, where he also served as inspector of "lepers." His tract on syphilis was completed on January 20, 1497, when he sent it to Johann Nell, a physician and friend at Strassburg, where it was printed, probably in the spring of that year. Sudhoff and Singer† knew of only four copies; since 1925 two more, including ours, have been recorded. The book was reprinted a few months later in Rome. Widmann called syphilis, as Schellig did, the French disease, both following the Edict of the Diet of Worms (1495), which they attended. Widmann made a differential diagnosis between leprosy and

*Read in part at the annual meeting of the Boston Medical Library, March 1, 1949.

†Sudhoff, K. Adapted by Singer, C. *The Earliest Printed Literature on Syphilis, Being Ten Tractates from the Years 1495-1498.* 352 pp. Florence, 1925.

syphilis, for he was long familiar with the former disease. He advised standing on the windward side of the syphilitic, a common practice in his time in dealing with lepers. In treatment, Widmann used mercury as had his predecessors. The Library also owns Widmann's *De pestilentia* (Tübingen, 1501) containing the reference to *malum franciae* in 1457, a date that seems quite improbable and may be a printer's error for 1495 or 1497. As Sudhoff says, "It is a matter on which we can only conjecture."

Of more importance was the work of Gaspar Torrella, who left his native city of Valencia in Spain in the late fifteenth century to seek his fortune in Italy. Coming from a well known medical family, this energetic young doctor was welcomed in Rome by a fellow-countryman, Roderigo de Borgia. The wily Roderigo, already a wealthy cardinal, bought up enough votes in 1492 to become Pope Alexander VI, and Torrella became his body physician and the medical adviser to the papal household. Among the Borgia family and the papal court, Gaspar had, in spite of his restricted clientele, a considerable experience with syphilis. During September and October, 1497, for instance, the papal physician treated seventeen cases of the *morbo gallico*. One of his patients was Cesare Borgia, the profligate son of the Pope, who, at the age of sixteen in 1493, had been made a cardinal by his father.

In Torrella's first publication, a tract of twenty-four leaves, issued in Rome in 1497, 5 typical cases are described. All were treated by mercurial ointment. The case presentations are "first hand," and this little pamphlet is the most valuable of all the early literature on syphilis. One of the case histories is almost certainly that of Cesare Borgia. Unfortunately, only three copies seem to have survived; none have reached America. A later work of Torrella, printed in Rome in 1500, attacks the subject in a lighter vein — a kind of prelude to the style of Fracastor's poem on syphilis of 1530. It is this book that was acquired by the Library in 1948.

TABLE 1. *The Earliest Printed Literature on Syphilis for the Years 1495–1498.*

AUTHOR	TITLE	KLEBS No.
Schellig*	*In malum de Francia consilium* [Heidelberg, 1495]	891.1
Grünpeck	*De pestilentiali scorra* [Augsburg, 1496]	476.1
—*	[Nürnberg, 1496–7]	476.2
—	*Ursprung des bösen Franzos* Augsburg, 1496	477.1
—*	[Nürnberg; 1497]	477.2
Leoniceno*	*De morbo gallico* Venice, 1497	599.1
Torrella	*Morbum gallicum* Rome, 1497	979.1
Widmann*	*De pustulis sive mal de franzo* [Strasburg, 1497]	1048.1
Gilino	*De morbo gallico* [Ferrara, 1497]	463.1
Stäber	*A morbo Gallorum* Wien [1497–8]	931.1
Montesauro	*Mal franzoso* [Bologna, 1498]	691.1
Scanaroli	*De morbo gallico* Bologna, 1498	887.1

*In Boston Medical Library.

Sixteenth-Century Imprints

Torrella's publication in 1500 brings us into the sixteenth century, an age of increasing output of medical works, for the presses were hard pushed to keep up with a growing demand for the easily transported book, movable in pocket or saddlebag, that could be used in the same text and at the same time by doctors in Cracow, Montpellier and Edinburgh. Thus, there took place a vast spreading of knowledge, not dreamed of before the days of printing. Having catalogued our fifteenth-century books in 1944 and recorded our addenda of incunabula in the *Report of the Librarian*, year by year, the Library is in the process of segregating its sixteenth-century holdings for convenience of recataloguing and adds to this new class of books as fast as funds will permit. Over sixty books printed before 1600 were acquired in 1948, including the pest ordinances of Antwerp for the years 1575, 1578, 1580 and 1586; an anti-pest tract by Cermisonus (Milan, 1512); Gesner's *Schatz* (Zurich, 1555); and the famous *Malleus maleficarum* by Sprenger and Institoris, in editions issued at Cologne (1520), Lyon (1584) and Frankfurt (1588).

Americana

In the field of Americana a few texts were added. Perhaps the most important were copies of the *Christian Watchman*, a Boston newspaper, for October 23, 30 and November 6, 1846, containing what appears to be an eye-witness account of the second ether operation at the Massachusetts General Hospital on October 17, 1846, and possibly of the first operation the day before. Medical letters include one by O. W. Holmes relating to his son's injury during the Civil War, correspondence from Zadok Howe to Moody Kent (1812–1827) and twenty-three letters from James Thacher, many to his daughter, written from Plymouth, 1784–1824.

Special Gifts

As usual the Library added many gifts from our fellows and friends. The list is a long one and the Library, as in the past, reflects the devotion of its users, whether fellows, members, hospitals or medical schools. The Harvard Medical School Library continued to send us inaugural dissertations and theses, as well as current Russian literature — classes of material that we, by mutual agreement, have arranged to keep in the Boston area. Dr. George Kelemen supplied us with Hungarian periodicals; Dr. Stephen Rushmore gave us a large part of his personal library and allowed us to purchase from

him a few of the more expensive items, much to our advantage; books and periodicals were received from the estates of Abraham Myerson, Richard F. O'Neill, Isadore E. Reid and George H. Torney; a substantial bequest was received from the estate of Walter P. Bowers; the Suffolk District Medical Society continued its support; and miscellaneous gifts were received from many others.

Library Activities

Addresses and Meetings

The Librarian addressed the annual meeting of the Cleveland Medical Library Association on January 16, 1948, reading a paper, "A Roving Commission: The doctor calls on some of his friends," describing a sojourn with Sir William Osler in Oxford in 1916 and a visit to the home of Arnold C. Klebs at Nyon in Switzerland in 1939. On February 10 he gave the Walter Reed Lecture before the Section on the History of Medicine, Richmond Academy of Medicine, entitled "James Thacher and His Influence on American Medicine," and was made an honorary member of the Section. The Librarian also visited, during the course of the year, the Army Medical Library, the medical libraries of the University of Minnesota, the Rhode Island Medical Society, the College of Physicians of Philadelphia, the John Crerar Library, Chicago, the St. Louis Medical Society and the Welch Medical Library, Baltimore. The Librarian attended the Section on the History of Medicine at the annual meeting of the American Medical Association, held in June in Chicago, and the meeting of the Honorary Consultants to the Army Medical Library in Washington, October 21 and 22, as chairman of the Committee on the History of Medicine. He was elected president of the American Association of the History of Medicine for two years at the annual meeting in Philadelphia in May.

The Director also attended the meeting of the Honorary Consultants to the Army Medical Library in Washington in October, the meeting of the Medical Library Association in Philadelphia in May and that of the Special Libraries Association in Washington in June.

In February the Library entertained in Boston Dr. Josep Trueta, formerly of Barcelona and now of Oxford, the authority on Servetus and author of *The Spirit of Catalonia* (London, 1946), and, in April, Dr. Douglas Robb, of Auckland, New Zealand. Both visited the Library, much to our profit.

Book Reviews

About 270 new books, received from the *New England Journal of Medicine*, were reviewed by the fellows and staff of the Library in 1948, either by short notes or by longer, critical reviews (about 80). Nearly 100 reviewers perform this task as a contribution to the Library. This service, one of outstanding merit, brings to the Library promptly many of the latest publications in medical literature and the new editions of older books for the benefit of our readers.

Exhibits

At various times during this year small exhibits were arranged in the Osler Exhibit Cases (donated to us by Osler from his Ingersoll Lecture honorarium of 1904) in the rotunda of the Library, largely of the chief current accession, complemented by other works in the Library. Among the books shown in 1948 were the writings of Giovanni Michele Savonarola (1384–1462), the Paduan physician. Also on exhibit were a collection of medals and tokens, illustrating medical numismatics, including the Baker Clinic diabetic medals recently presented to the Library by Dr. Joslin, and a portrait and the original article on DDT in honor of Paul Mueller, winner of the Nobel Prize in Medicine for 1948.

Conferences

A conference with nineteen of the medical librarians of Metropolitan Boston was held at the Library on October 30, 1948. The Director acted as chairman for the discussion of various library problems including library statistics, losses and their control, co-operation and the relation of the Boston Medical Library to other medical libraries, damaged material, foreign periodicals and their coverage, inter-library loans and other topics. Consideration was given to the possibility of organizing the conferences on a semiofficial basis, and it was agreed that this should be done, with at least two meetings a year and at different libraries.

Publications

Recent articles emanating from the Library are as follows:

Seventy-second Annual Report of the Boston Medical Library for the Year 1947. Boston: privately printed, 1948.

Phippen, W. G. Boston Medical Library. Report of the president. *New Eng. J. Med.* **239**:83-84, 1948.

Viets, H. R. Boston Medical Library. Report of the librarian. *New Eng. J. Med.* **239**:84-89, 1948.

Idem. History of neurology in last one hundred years. *Bull. New York Acad. Med.* **24**:772-783, 1948.

Idem. Roving commission: doctor calls on some of his friends. *Bull. Hist. Med.* **22**:362-372, 1948.

Editorial. Wotton and Trueta on Servet. *New Eng. J. Med.* **238**:887, 1948.

Editorial. Sherrington's classic contribution to neurophysiology. *New Eng. J. Med.* **239**:101, 1948.

Ballard, J. F. History of the Medical Library Association. *Bull. M. Library A.* **36**:227-241, 1948.
Idem. Notes from Boston Medical Library. *New Eng. J. Med.* **239**:490, 1948.
Editorial. Manuscripts and medical history. *New Eng. J. Med.* **239**:723-725, 1948.

Varia

A few of the books of unusual interest to medical scholars, published recently, deserve notice. *Pioneer Life in Kentucky, 1785–1800*, by Daniel Drake (New York, 1948), edited from the original manuscript by Emmet Field Horine, was first issued in 1870. Dr. Horine went back to Drake's original letters, now in the Cincinnati General Hospital and long out of print, as is a reprinting of 1907, only to find that previous editors had taken many liberties. The book, now edited with scholarly accuracy, is not a medical treatise, but a portrayal of farm and family life by the most eminent early nineteenth-century physician of the Central West. Another physician, George W. Corner, has performed a similar task for Benjamin Rush, editing his autobiography from the original manuscript for the American Philosophical Society. *The Autobiography of Benjamin Rush: His "Travels Through Life" together with his Commonplace Book for 1789–1813* (Princeton, 1948) is superbly and meticulously documented by Corner, with numerous illustrations. A delightful book of essays is *Wayfarers in Medicine* (London, 1947), by William Doolin, the editor of the *Journal of the Royal Academy of Medicine in Ireland*, a salty, varied series of sketches ranging from "Graeculi Esurientes" to "Osler." Among the best are "Some Old Journeyman Surgeons" and "Pathfinders in Dublin." Sharp, too, is *Rabelais* (London, 1948) by John Cowper Powys, a translation of his life story and an interpretation of his genius. Powys, in a thoughtful book, takes you "on sunny morning stops" where Rabelais meets his friends. One notes further *The Legacy of Swift. A Bi-Centenary Record of St. Patrick's Hospital, Dublin* (Dublin, 1948); *Dr. Kirkbride and his Mental Hospital* (Philadelphia, 1947), by Earl D. Bond; *The Story of St. Thomas's 1106–1947* (London, 1947), by Charles Graves; *Encyclopedia of Medical Sources* (Baltimore, 1948) by Emerson Crosby Kelly; *The Physicians of Essex County* (Salem, 1948), by Russell Leigh Jackson; *Religio Medici* (Lund, 1948), by Thomas Browne, translated into Swedish by Ernst Abramson; a provocative book, *Surgery Orthodox and Heterodox* (Oxford, 1948), by Sir William Heneage Ogilvie; and *Selected Writings of William Clowes* (London: 1948), with a delightful introduction by F. N. L. Poynter, of the Wellcome Historical Medical Museum.

Henry R. Viets

MEDICAL PROGRESS

NEUROPHYSIOLOGY, 1942–1948 (Concluded)*

John F. Fulton, M.D.†

New Haven, Connecticut

The Pyramidal System and the Motor Areas

The Pyramidal System

An even more profound modification has taken place in beliefs concerning the origin and nature of the pyramidal system. Current texts in neurology generally state that the pyramidal tracts take origin from the giant cells of Betz in the motor area (area 4) and from a few similarly large cells in the parietal cortex. This view is based largely upon the studies of Holmes and May,[61] published in 1909, these authors having found in cases of spinal transection in man that retrograde degeneration in the cerebral cortex was limited to the cells of Betz. Lassek, in a series of 19 papers on the pyramidal tract of man and animals,‡ finds that whereas there is an average of 34,000 Betz cells in a given hemisphere (that is, cells between 900 and 4100 sq. microns in size), there are 1,000,000 fibers in a human pyramid. This discrepancy between numbers of Betz cells and fibers in the pyramid indicates that the Betz cells can contribute at most 2 or 3 per cent of the fibers in the human pyramid, and that the greater proportion must come from some other source. The Betz cells no doubt give rise to the larger fibers in the pyramid, for fibers of large diameter increase in proportion as the primate scale is ascended, and so does the size of the Betz cells.

In attempting to discover from what other parts of the cerebral cortex the pyramidal tract might arise, Woolsey and Chang[63] have carried out the ingenious experiment of leading off electrically from the surface of the cortex while the pyramids are being stimulated antidromically at the level of the medulla. Using rabbits, cats and monkeys they find that an antidromic action potential can

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‡These papers are summarized in the 1948 volume of the Association for Research in Nervous and Mental Disease.[62]

be detected over wide areas of the cortex in all three species, including fields 6, 4, 3-1-2, 5 and 7 of Brodmann. In the monkey and cat two waves can be detected — a fast one, which is most conspicuous in area 4 (and its counterpart in the cat), followed by a slow wave, which is present in all the areas just mentioned. In the cat the slow wave is much larger relatively than the fast wave, and in the rabbit only the slow wave can be detected. These findings are in harmony with the belief that the faster spike wave represents the contribution of the large fiber components, for in the rabbit there are no large fibers, and in the cat the proportion of large fibers is much smaller than that in the monkey (Lassek). It becomes necessary, therefore, to regard the pyramidal tract as taking origin from the entire precentral convolution as well as from the full extent of the parietal lobe, and it is therefore concluded that only the fast fiber components are primarily restricted to area 4.

The effects of *interruption* of the pyramidal tract at the level of the pyramid have also proved surprising in the light of earlier neurologic teaching, for the spasticity that was thought to be characteristic of an upper motor neuron lesion is completely lacking; indeed, Tower[64, 65] finds, both in monkey and chimpanzee, that the skeletal musculature on the affected side is flail and that the muscles themselves undergo conspicuous atrophy as a result of disuse. This result was scarcely surprising since it was known that similar flaccidity is seen after isolated lesions of area 4 in chimpanzees; such lesions, however, involve extrapyramidal, as well as pyramidal, projections. This no doubt accounts for the transient digital spasticity that Denny-Brown and Botterell[65a] observed in monkeys after partial lesions of area 4. The flaccid character of the paresis seen by Tower makes imperative some modification of the older view, espoused by Walshe[67] and others, that all the phenomena following interruption of the corticospinal system are to be interpreted as "release phenomena." Thus, Tower writes: "In the realm of motor function the condition is unquestionably one of deficient function without phenomena of release," adding that "there is no evidence of inhibitory function [in the pyramidal system]." Walshe[67] objects to this interpretation, for he contends that the Babinski plantar response must be looked upon as an example of release of a phasic nociceptive reflex from cortical control. The point is perhaps an academic one, but if Dr. Walshe will accept flaccidity and atrophy as an essential part of the pure pyramidal syndrome in man and the higher primates, one will not begrudge his insistence that the Babinski reflex is to be regarded as a release phenomenon. Denny-Brown[66] characterizes Tower's classic description of the effect of pyramid section as "the final blow to the clinical conception of disorder of the pyramidal system," but Walshe considers such an obituary premature.

It may prove more difficult to bring Dr. Walshe to terms on the question of whether individual muscles find representation in the motor area, or only movements. Believing that the controversy could be resolved more readily by recourse to experiment than by philosophic reflection, Chang, Ruch and Ward[68] isolated eight representative muscles in a series of monkeys, attaching each muscle to separate myographs; they then explored the responsiveness of several muscles to unipolar stimulation of various foci on the motor area. With minimal intensity of stimulation they found that certain points gave "solitary responses," — that is, an isolated reaction of a single muscle unaccompanied by contraction of any other muscles under observation. Such a group of solitary reactions is shown in Figure 6. Not only were individual muscles represented, but in some instances small portions of a given muscle were separately stimulable.

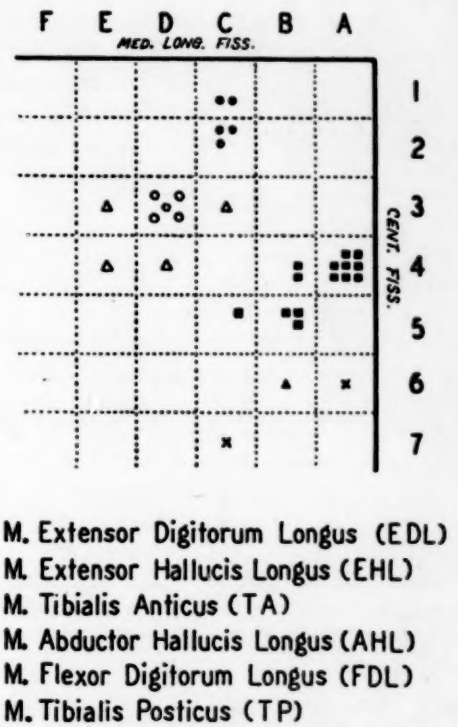

FIGURE 6. *Distribution of Cortical Foci for Different Muscles from Which Solitary Responses Can Be Obtained. (Reproduced from Chang, Ruch and Ward[68] with the Permission of the Publishers.)*

In discussing their results, Chang and his associates write:

> Inspired by the dictum of Hughlings Jackson . . . that movements rather than muscles are represented in the motor cortex other investigators have emphasized the instability of the cortical mosaic and a multiplicity and diffuseness of representation of muscles in the motor cortex. . . .This formulation leaves out of account the fact that a somatic movement, however complex, is produced

by the contraction of muscles. As a consequence, at some level, muscles must be represented as muscles so that they can be manipulated and organized into movements.

Hines[69] is even more outspoken:

> The above study indicates that in the precentral gyrus of the macaque there is a detailed pattern of representation of the skeletal muscular system and that the basic plan of this pattern can be analyzed in terms of muscles. Thus, although there is overlapping of cortical fields for peripheral cutaneous areas, individual muscles are represented maximally in specific parts of the precentral gyrus, just as areas of skin are represented maximally at particular points on the postcentral gyrus. This does not mean that a particular muscle is the only muscle represented at a specific cortical point, but that it is the one predominantly represented there.

The maps of muscle foci observed by Chang et al. suggest that "the Betz cells for a particular muscle

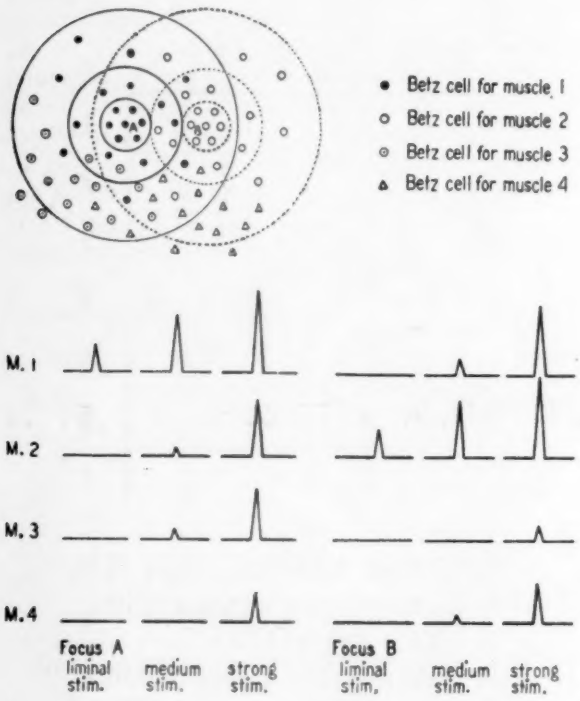

FIGURE 7. *Diagrammatic Representation of the Hypothetical Distribution of Betz Cells for Individual Muscles with Cell Group for Each Muscle Having a Focal Distribution and an Overlapping Fringe.*

Each symbol stands for a Betz cell, and the large concentric circles represent the sphere of excitation. The expected contraction of the muscles in response to cortical stimulation at different strengths is shown by the curves drawn in the lower part of the figure, in which the magnitude of the contraction is determined by the number of Betz cells involved in the sphere of excitation. (Reproduced from Chang, Ruch and Ward[68] with the permission of the publishers.)

are distributed over a contiguous area of the cortex with the highest cell concentration located at a particular focus within that area, and that the farther from that focus, the more sparsely scattered are the Betz cells devoted to that muscle." They thus envisage a considerable overlapping of the fringes of each field of Betz cells, which is illustrated schematically in Figure 7.

Broadly considered, the pyramidal tract must be regarded, as Sherrington originally insisted in *The Integrative Action of the Nervous System*, as an internuncial pathway between the motor mechanism of skeletal muscle and the distance receptors impinging upon the higher levels of nervous function. As Walshe[67] has aptly put it, the pyramidal tract "is a sort of common path standing between the receptors . . . and the motor mechanisms of the nervous system." This view should have the hearty concurrence of those who have performed experiments in this field.

The Motor Area

Perhaps the most notable advance in the sphere of the motor area has been Rasmussen and Penfield's[70] résumé of their experience in stimulating the precentral and postcentral convolutions during 206 operations (principally under local anesthesia)

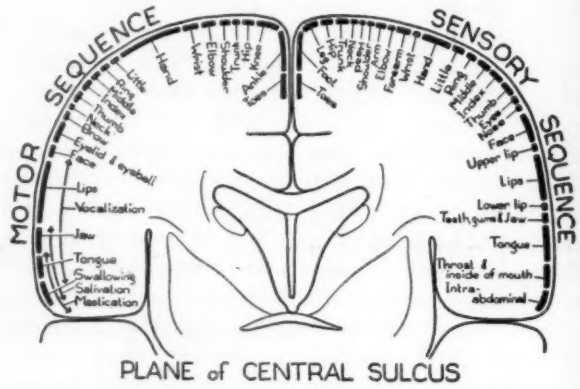

FIGURE 8. *Motor and Sensory Sequence in the Human Cerebral Cortex.*

This is based on observations in 222 operations carried out under local anesthesia. (Reproduced from Rasmussen and Penfield[70] with the permission of the publishers.)

on 186 patients and their more recent report on stimulation of the human eye fields.[71] The sequence of sensory representation in the postcentral gyri had long been thought to correspond with that of the precentral motor cortex, but these observers find that the sensory projections of the head fall between trunk and arm (Fig. 8). Their illuminating summary may be quoted:

> 1. As a result of further stimulation studies in man, certain modifications in the sensory sequence are suggested: (a) The head as a whole is represented between trunk and arm. (b) Neck sensation seems to belong between the head representation and trunk. (c) Tongue sensation has been moved to below teeth, gums and jaw, conforming to its location in the motor sequence. (d) Taste has been eliminated from the sequence of the cortical convexity since it occurs very rarely as a result of stimulation here, although somatic sensation in the tongue is the most frequent sensory response in the face area. (e) Intra-abdom-

inal sensation has been added to the lower end of the sequence, below throat. The extent of this representation, which is largely precentral, into the island of Reil has not yet been determined.

2. Sensory responses simultaneously in more than one of the area units of the face region are fairly frequent. The same is true among the units of the upper extremity. It is, however, very rare that overlap occurs between the three major regions — face, upper extremity, lower extremity. This may cast light on the fact demonstrated by Dusser de Barenne and McCulloch that each of these regions may be activated in animals by local application of strychnine without activating the adjacent major region.

3. Stimulation of the banks of the Rolandic fissure has shown that the sensory and motor responses produced there are similar in character and location to those elicited from the superficial surfaces of the pre- and postcentra gyri.

4. In the motor sequence certain minor alterations are also suggested: (a) Salivation and mastication are represented in the lower portion of the motor face area. The latter is predominantly postcentral in location and below tongue, whereas simple jaw movements are predominantly precentral in location and located above tongue. (b) Neck movements are represented between the area for finger movements and the upper margin of the face area.

5. Vocalization may be produced in man from an area between upper face and throat of both the dominant and nondominant hemispheres, either alone or with movement or sensation in the various structures about or in the mouth.

6. Conjugate eye movements toward the opposite side are produced by stimulation anterior to the precentral gyrus without seeming to be confined to a discrete architectonic area. Eye movements produced from the precentral gyrus may be conjugate to either side or upward, or may be movements of convergence. Eye sensation is produced by stimulation anterior to the central fissure but not posterior.

7. Evidence is presented for the possible existence of a second sensory area for arm and leg in the cortex adjacent to the fissure of Sylvius. It seems likely also that there may exist in the same zone a second representation of movement.

Secondary motor areas. As indicated in Rasmussen and Penfield's last paragraph, there is some suggestion that secondary sensory areas exist as Adrian[72] and Woolsey[73] have indicated, but that there is also evidence of the existence of a secondary *motor* field. Speculations in this connection have indeed been rife for some time. Thus, in 1943 Garol[74] found a second motor area in the cat lying in the inferior portion of the anterior ectosylvian gyrus, and here the representation was inverted as compared with that of the first motor region, — that is, the leg area was more lateral than the arm and head, — just as Woolsey and Fairman[75] have found for the second sensory area of the cat and monkey.[76] French, Sugar and Chusid[77] find on strychninization of the buried opercular surface that it "fires" heavily into areas 4 and 6 and also into postcentral gyri. To quote these authors further:

> The arrangement of connections as found by strychnine neuronography agrees with the somatotopic arrangements found on sensory and motor explorations. Anterior segments of the superior Sylvian bank communicate more actively with the inferior portions of the pre- and postcentral gyri, while the more posterior segments of the infraparietal plane are more strongly connected with the superior portions of areas 4 and 1. The face region is thus predominantly anterior, and the leg region posterior, in the superior Sylvian bank — an arrangement which agrees well with the other studies.

The functional significance of these second sensory and motor areas is thus being effectively elucidated through the use of Dusser de Barenne's invaluable new technic of strychnine neuronography.

Extrapyramidal Functions

The secondary motor areas described above belong strictly to the extrapyramidal division, but they have been grouped with the corticospinal system since normally they discharge principally through the pyramids. The interaction, however, between the pyramidal outflow and that of extrapyramidal projections from the cortex and from subcortical levels, is close-knit, and they are difficult to disassociate in the intact animal. Denny-Brown,[66] in his monumental treatise on the diseases of the basal ganglions and subthalamic nuclei, is the first clinical writer to give adequate attention to the part played by the cerebral cortex in genesis of symptoms of extrapyramidal disease, although Kinnier Wilson[78] had pointed the way.

The underlying mechanism of the so-called extrapyramidal syndromes, such as Parkinsonism, chorea and other hyperkinetic states, has been clarified during the past five years through experimental studies carried out on primate forms. The fact that the suppressor areas of the cerebral cortex — that is, areas 2s, 4s, 8s and 24 — operate by direct connection with the striate bodies and thence via the thalamus back to the cerebral cortex indicates that one cannot regard the extrapyramidal system as separate from the cerebral cortex. The suppressor bands in the chimpanzee are shown in Figure 5.

Many years ago Kinnier Wilson[78] insisted that the tremor of Parkinsonism must originate in the cerebral cortex through the operation of extrapyramidal projections unsupported by the striatum and subthalamic nuclei. Bucy[79] has offered the hypothesis that since the extrapyramidal suppressor bands operate through a circuit involving the striatum, thalamus and thalamocortical projections, interruption of that circuit at any point — be it the corticostriatal path, the caudate nucleus, globus pallidus, thalamus or the thalamocortical projection — may give rise to manifestations of Parkinsonism. This hypothesis harmonizes with the known variability of pathologic lesions in Parkinsonism. It does not, however, fully account for the fact that the substantia nigra and reticular formation are generally heavily involved in advanced Parkinsonism. Moreover, Ward, McCulloch and Magoun[80] find that the syndrome of tremor and rigidity, closely akin to Parkinsonism in man, can be precipitated experimentally in monkeys by Horsley-Clarke lesions involving the reticular formation throughout its entire length. Attempts to reproduce the syndromes in monkeys and chimpanzees by lesions of the striatum have been uniformly disappointing, and Ward's results strongly suggest that the vital lesion of Parkinsonism lies in the reticular formation. One of

Kennard and Fulton's[81] chimpanzees showed marked athetoid movements following a lesion restricted to the globus pallidus, which indicates that athetosis and Parkinsonism are no doubt distinguishable in terms of basic mechanisms.

Comparative studies of the type just outlined lend support to the view that many of the extrapyramidal syndromes that occur in human beings are probably peculiar to the human nervous system. It has been impossible, for example, to cause anything remotely approaching chorea or athetosis in a dog or a cat. In monkeys states similar to chorea in man have been seen, and in the chimpanzee present indications are that one may be able through isolated destruction of the individual extrapyramidal nuclei to evoke many more of the clinical extrapyramidal syndromes.

Applications

Relief of hyperkinetic states. The therapeutic uses to which the newer knowledge of cerebral function may be put have begun to be dimly appreciated, but the wider applications are undoubtedly in their earliest developmental stages. Parkinson,[82] in his celebrated essay on the shaking palsy, observed in 1817 that tremor of long standing disappeared after a hemiplegia; many similar instances of tremor vanishing subsequent to a stroke can be culled from the clinical literature. In 1909 Horsley[83] removed the arm area of a fourteen-year-old boy who had had severe unilateral athetosis for seven years; the patient's athetoid movements were completely suppressed after the ablation, and they continued so for a year (when the patient had been last examined). It is incidentally interesting that the patient suffered a severe flaccid paralysis as a result of the ablation, but this seems not to have made an enduring impression upon the neurologists who had examined the case.

With the revival of interest in functional localization in the cerebral cortex neurosurgeons, especially Bucy and Buchanan,[84] Bucy[85] and Sachs,[86] have lately begun to make cortical ablations for the relief of focal seizures (in which the results have been for the most part excellent), and also for the relief of hyperkinetic states—choreoathetosis, hemiballismus, torsion spasm and so forth. Opinion, however, has been divided regarding whether ablations of area 6 or of area 4 are the more effective. It is Bucy's contention that the involuntary movements of chorea and athetosis arise from premotor discharge via the pyramidal system. Klemme[87] shares a similar view concerning the origin of Parkinson tremor and favors premotor ablation since he believes it less debilitating from the motor standpoint. Bucy[88] has recently reported upon a striking case of unilateral weakness and athetosis that had persisted for fifteen years in a twenty-three-year-old man. After isolated ablation of area 4, tremor was completely and permanently abolished, and although the patient suffered considerable paresis and excessive sweating in the affected extremity, the relief from his tremor proved particularly dramatic.

Suppressor areas in man. It is of primary significance that Garol and Bucy,[89] in their patient from whom area 4 was ablated for the relief of tremor, were able positively to identify 4s, the suppressor band lying just rostral to the anterior margin of area 4 (Fig. 9). On stimulation of this region, resting contraction of all muscles on the opposite side of the body was inhibited, the threshold for stimulation of area 4 itself was greatly increased, and the effect persisted for several minutes after stimulation. The observation is important, for it represents the first positive demonstration of the existence of a suppressor band in the human brain, the position of the band being closely similar to that of area 4s in the chimpanzee (Fig. 10). This fact takes on fresh significance in the light of the recent study of Russell[90] on the relation of site of lesion to subsequent development of seizures in a series of cases of gunshot wounds of the brain.

Traumatic epilepsy. Many who have had experience with gunshot injuries of the brain have noted the fact that some patients develop epileptic sequelae, whereas others—with seemingly similar wounds and with similar post-traumatic history—have failed to do so. Russell,[90] impressed with the possibility that the suppressor bands discovered by Hines[91] (and brilliantly elucidated in the chimpanzee by Dusser de Barenne and McCulloch[92]) have some causal relation to focal seizures, has plotted the site of injury in 138 cases of post-traumatic epilepsy and in 222 cases in which convulsions had not developed eighteen months to three years after wounding. The sites of wounding in the epileptic cases tended to accumulate in certain zones that correspond closely to the position of the suppressor bands as worked out in the chimpanzee. Little is known as yet concerning the actual position of the suppressor areas in man (except for the observation of Garol and Bucy[89] on area 4s), but there is every reason to suppose that they correspond to those in the chimpanzee. These important findings suggest that destruction of a suppressor band would release epileptogenic foci from inhibitory control and so precipitate seizures. Russell has put forward his findings with the greatest modesty, but many are prepared to believe that he has made a discovery of outstanding significance to neurology.

The Cerebellum

The advances in knowledge of frontal-lobe function parallel those concerned with the cerebellum. Thanks to the work of Larsell[93] and Dow,[94] the cerebellum has emerged as a tripartite organ with discrete functional localization in three major spheres of integration: equilibration in the flocculonodular lobe, postural regulation in the anterior

lobe and regulation of phasic volitional movement in the posterior lobe (that is, in the cerebellar hemispheres). The anatomic correlates of this functional triad are also clear-cut, for the flocculonodular lobe is the only part of the cerebellum that both sends to and receives fibers from the vestibular nuclei. The anterior lobe receives the spinocerebellar projection and sends motor bundles to the reticular formation, red nucleus and other levels of extrapyramidal motor function; the posterior lobe receives its primary input from the frontopontocerebellar projections arising in the cerebral cortex.

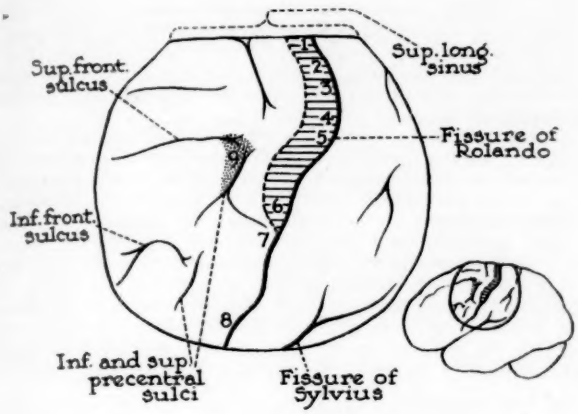

FIGURE 9. *The Suppressor Area 4s in the Human Cortex. The stippled area 9 when stimulated caused generalized muscular relaxation, a rise in threshold of stimulation of points 1–8 in Area 4 and curtailment of after-discharge of area 4 responses. The shaded area shows the strip of area 4 that was subsequently ablated. 1 — flexion of the right hip; 2 — contraction of the right quadriceps femoris muscle; 3 — contraction of the right pectoralis major muscle; 4 — flexion of the fingers of the right hand; 5 — flexion of the right elbow and wrist; 6 — movement of the neck and right shoulder; 7 — movement of the right corner of the mouth and contraction of the right platysma myoides muscle; 8 — movement of the lower lip on the right side; and 9 — suppressor area (area 4s). (Reproduced from Bucy[87] with the permission of the publishers.)*

Beyond these large primary divisions there has been until recently little evidence of more precise functional localization. Focal lesions, to be sure, had been made, both in the posterior and in the anterior lobe, but the resulting deficits never appeared to be sharply restricted to a given muscle group, or even to a given extremity. The only localization that was recognized was that the right half of the cerebellum presided over the homolateral musculature and the left over the musculature on its side. The first suggestion of more precise functional localization came from study of action potentials led off from the cerebellar cortex by Snider and Stowell.[95] They found, when the upper extremity was stimulated, that well developed action potentials appeared in the culmen, whereas when the hind extremity was stimulated, the primary responses appeared in the centralis. These studies were later considerably extended by Adrian,[96] who obtained the same pattern of reaction with lumbar and sacral segments.

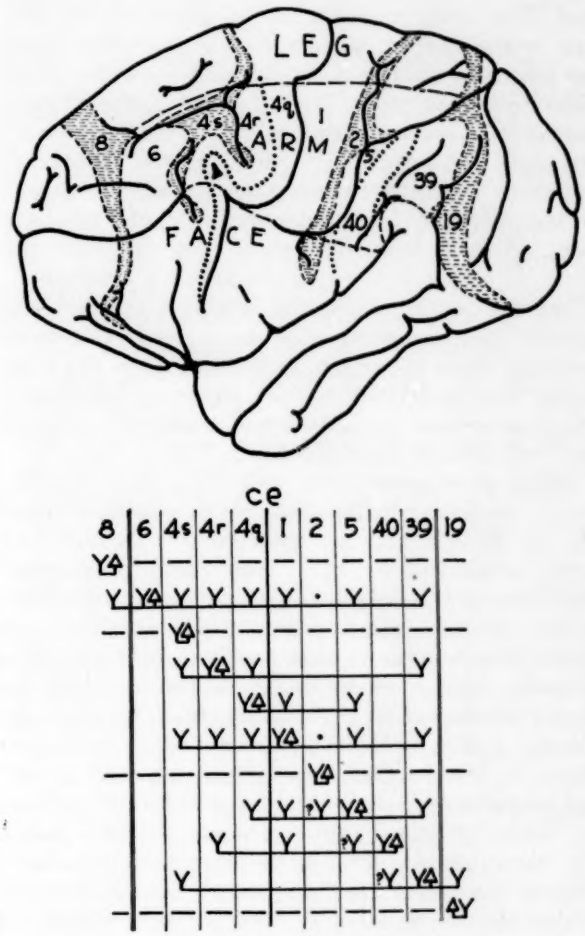

FIGURE 10. *The Suppressor Areas in the Chimpanzee. Map indicates areas of sensory and adjacent cortex, distinguishable by physiologic neuronography, in* Macaca mulatta (a) *and* Pan satyrus (b). *Below are diagrams indicating maximal axonal field disclosed by repeated strychninizations in area marked Δ. Horizontal dashes indicate suppression of electrical activity; Y indicates area fired; ce refers to central sulcus; double vertical lines indicate anterior and posterior borders of sensory cortex. (Reproduced from McCulloch, [Chapter VIII] in Bucy,[88] p. 233, with the permission of the publishers.)*

The face, similarly, had representation more posteriorly in the posterior culmen and lobulus simplex. Adrian[97] made the interesting observation that the pig, which so largely depends upon its nose for its food supply, has a relatively enormous representation of its snout in sensory cortex.

The problem of functional localization in the anterior cerebellum has also been approached by

two other methods — namely, focal ablation and combined cortical and cerebellar stimulation. The ablation studies, which were begun by Connor[98] in 1940-41, gave unsatisfactory evidence, for although there appeared to be, in the dog at least, fairly clear evidence of functional localization, the effects were seldom sharply confined to a single extremity, and he was at first under the impression that such localization as appeared to exist was in the reverse sequence of that indicated by the electrical studies of Snider and Stowell. In an effort to obtain more satisfactory evidence of focal lesions, Soriano and Fulton[99] used the device of removing areas 4 and 6 from the cortex (monkeys) at a first operation (which gave a moderate degree of spasticity in both extremities of the opposite side). A focal lesion was then made in either the centralis or the culmen of the anterior cerebellum. When the lesion was in the centralis, the hind extremity became noticeably more rigid and more awkward than the upper extremity; when the focal lesion was restricted to the culmen, the reverse was true — that is, the upper extremity showed the most conspicuous effect.

Much more satisfactory, however, were the combined corticocerebellar-stimulation studies carried out by Nulsen and his associates.[100] Nulsen had been influenced by the report from Hampson, Harrison and Woolsey[101] that primary stimulation of the anterior lobe appeared to show evidence of localization similar to that disclosed by Snider and Stowell. Nulsen et al. found that a cortically induced movement of a given extremity, such as the thumb, could be inhibited from a sharply defined focus on the anterior cerebellum and that a cortically induced movement of another muscle could be inhibited from another highly discrete focus. On mapping the cerebellum after this procedure, Nulsen was led to conclude that a degree of localization almost as sharp as that in the motor cortex itself exists in the anterior cerebellum and that a homunculus illustrating this generalization can be properly drawn. His summary was as follows:

> Utilization of the inhibitory effect of cerebellar stimulation upon existing motor activity has permitted mapping of the anterior cerebellum as an homunculus representing individual muscles. The cerebral motor cortex or bulbar pyramid are stimulated at regular intervals and the uniform contractions of a single muscle are recorded. Simultaneous stimulation of cerebellar points is then undertaken to establish the location most effective for inhibition of response in that muscle. Such studies in the cat, dog, monkey, and chimpanzee under dial anesthesia show that the point corresponding to tail, hind-limb, fore-limb, and face musculature have an anteroposterior arrangement in lingula, centralis, culmen, and simplex lobules, respectively. Further localization in the monkey indicates that proximal muscles, as those of the upper arm, are best inhibited by ipsilateral cerebellar points near the mid-line, whereas distal muscles, such as the adductor pollicis, are best modified by lateral points in the same lobule. The homunculus for efferent effects thus obtained corresponds to that evolved by Snider and Stowell by observing the localized electrical activity of the cerebellar cortex induced by tactile stimulation.
>
> In each animal, excepting the cat, increasing the frequency of cerebellar stimulation will result in facilitation rather than inhibition of the existing motor movement. The cerebellar homunculus for such facilitation is identical to that obtained when working with inhibition at low frequencies. The dentate nucleus (probably the dorsomedial portion) is involved in inhibition since its bilateral destruction allows only facilitation on surface stimulation, while its direct stimulation yields pure inhibition at all frequencies. Parallel evidence indicates that the fastigial nuclei transmit facilitatory impulses. Analysis of the effects of additional lesions of the brain-stem and cerebellar peduncles, combined with the oscillographic evidence of Snider, Magoun, and McCulloch, suggests that both inhibition and facilitation are ultimately mediated through the bulbar reticular formation.
>
> Thus the same cerebellar point which receives tactile stimuli from a localized somatic area will upon electrical stimulation modify motor activity in the same region of the body. Depending upon the frequency of the stimulus, either inhibition or facilitation can be elicited from the same surface point. Evidence suggests that the pathways for the two effects then diverge to travel through different roof nuclei into the suppressor and facilitatory areas of the reticular formation. It is possible that these results of electrical stimulation may mimic the mechanisms by which the anterior cerebellum modifies the movements of an extremity in response to afferent impulses.

If the anterior cerebellum has given up some of its secrets, one can make an even more substantial claim for the flocculonodular lobe, for the war investigations of Bard et al.[102] have disclosed that ablation of this ancient nucleus (and of no other part of the forebrain) confers dramatic protection against motion sickness. Bard finds that dogs, whose susceptibility to vomiting when placed in a swing has been carefully appraised, continue to vomit after removal of any part or all of both cerebral hemispheres; even decerebration does not alter their susceptibility to swing sickness. The anterior and posterior lobes of the cerebellum can similarly be removed without effect, but if the nodulus is taken out in an otherwise unaltered animal, it can be swung for indefinite periods without signs of nausea and without the appearance of vomiting. The academic importance of this disclosure is, of course, considerable; whether my neurosurgical colleagues will take advantage of it in dealing with less seaworthy subjects remains an open question.

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CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

Weekly Clinicopathological Exercises

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

BENJAMIN CASTLEMAN, M.D., *Associate Editor*

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CASE 35231

PRESENTATION OF CASE

First admission. A sixty-five-year-old man, a newspaper editor, entered the hospital with the chief complaint of chest pain of three and a half hours' duration.

The patient had been entirely well until about ten days before admission, when he noted for the first time some substernal pain. This first attack came on after his noon meal, while he was walking, lasted two or three minutes and was characterized as a dull, aching, substernal, nonradiating pain. Since then he had about one mild similar episode each day, usually coming on after eating or walking. On the morning of admission, while working at his desk, the patient again noted the onset of a substernal and precordial pain. This increased in severity over three quarters of an hour. This time the pain was of constant, severe nature in the left chest and precordium, without further radiation. The patient began to sweat and went into mild peripheral circulatory collapse. A physician admitted him to the hospital two hours after the onset.

The past history was noncontributory.

Physical examination revealed a well developed and well nourished man in mild discomfort. There were no other significant abnormalities.

The urine had a specific gravity of 1.016, with a + test for albumin, and the sediment centained 5 white cells per high-power field. The white-cell count was 20,800, with 72 per cent neutrophils. The hemoglobin was 15.1 gm. A blood sedimentation rate was 13 mm. per hour. An electrocardiogram showed findings consistent with a recent anterior myocardial infarct.

The patient was given quinidine sulfate and dicumarol. The prothrombin time was maintained throughout the hospital stay at an average level of about 35 per cent of normal. The white-cell count remained distinctly elevated, with figures of 20,800, 19,400, 16,000, and at the time of discharge 12,300. The patient stayed in the hospital five weeks. His hospital course was relatively uneventful. He continued to sweat profusely at times. Three weeks after admission he had an episode of profuse sweating, with discomfort in his epigastrium, which came on after lunch, lasted about ten minutes and then disappeared. There was no real pain associated with this. There was no other change in his physical

signs, and there was no recurrence of these symptoms. He was discharged at the end of five weeks.

Final admission (two months later). After leaving the hospital, the patient continued to do well, and he gradually arrived at the state where he could be up and around his home on one floor most of the day, with short rest periods and without symptoms. About five weeks after discharge, however, he began to have some paroxysmal dyspnea and orthopnea. He was digitalized and temporarily relieved, but because of increasing dyspnea in spite of digitalization, he was readmitted to the hospital.

Physical examination showed a pale and apprehensive man with distended neck veins. There were scattered rales, dullness and diminished breath sounds at both bases. Tactile and vocal fremitus at the right base was diminished. The heart was enlarged, the sounds were slightly diminished, and there was a protodiastolic gallop. The liver edge was percussed 2 cm. below the costal margin. The prostate was symmetrically enlarged. There was no peripheral edema.

The temperature was 99°F., the pulse 92, and the respirations 24. The blood pressure was 170 systolic, 90 diastolic.

There was no change in the urinary finding from the previous admission. The white-cell count was 19,000, with 84 per cent neutrophils. The hemoglobin was 13.4 gm. The nonprotein nitrogen was 27 mg. per 100 cc. The chloride was 86 milliequiv., the carbon dioxide 33.7 milliequiv., and the sodium 133.9 milliequiv. per liter. An electrocardiogram was consistent with a healing anterior myocardial infarct. X-ray examination of the chest showed cardiac enlargement, both to the right and to the left. There was bilateral pulmonary edema, and a moderate pleural accumulation on the right.

In spite of intensive therapy, including full digitalization, mercurial diuretics, a low sodium regime and oxygen therapy, the patient remained in congestive heart failure, with recurring episodes of pulmonary edema that were very nearly fatal for a period of almost two weeks. A venesection produced some temporary improvement. The patient was febrile, the temperature being elevated to 102°F. by rectum for the first week. On the third hospital day he was started on penicillin (300,000 units a day), and the temperature returned to normal three days later. Penicillin was discontinued on the tenth day. The patient developed acute urinary retention when he was first admitted, and this necessitated placing him on constant bladder drainage. In addition to digitoxin, penicillin and aminophyllin, quinidine was added as part of the therapy because of cardiac irregularities. The abdomen was very distended and tympanitic, and the patient gradually accumulated fluid in the right chest. In the face of strenuous and heroic therapy, he gradually improved. The lungs became less congested. The pitting edema of the thighs and sacrum, which developed soon after admission, had subsided by the tenth hospital day.

The laboratory data about the tenth hospital day revealed a hemoglobin of 9.5 gm., a white-cell count of 18,000, a normal urine, a nonprotein nitrogen of 31 mg., and a serum protein of 6 gm. per 100 cc., a sodium of 133.6 milliequiv., a chloride of 82 milliequiv. and a carbon dioxide of 31.5 milliequiv. per liter. At the end of two weeks right-sided heart failure recurred as manifested by increasing distention of his neck veins, increasing fluid in his right chest, enlargement of the liver and marked distention of the abdomen. A chest x-ray film showed no change. Because of increasing difficulty in breathing and discomfort in the right chest a thoracentesis was done, yielding 1000 cc. of clear, straw-colored fluid. This procedure afforded considerable relief of symptoms.

On the nineteenth hospital day, he began complaining of epigastric fullness, discomfort and hiccups. There was abdominal distention, most marked in the epigastrium. There was no spasm or tenderness. The abdomen was tympanitic. Stomach and rectal lavage was done, relieving the abdominal discomfort somewhat. The temperature, which had been normal, began to spike to levels of 101-102° F. Coincident with this last episode he became drowsy, lethargic and occasionally disoriented. The sodium was 119.1 milliequiv., chloride 82 milliequiv., and carbon dioxide 27.1 milliequiv. per liter. The nonprotein nitrogen was 32 mg. per 100 cc. He was given measured quantities of sodium chloride, crysticillin and sulfadiazine. His mental condition improved, but the fever and white-cell count of 22,000 continued. A urine culture showed colon bacilli and rare beta-hemolytic streptococci. After a week on crysticillin and a week on sulfadiazine without any effect on the temperature, streptomycin was started in dosage of 2 gm. a day. Six days later his temperature returned to normal and remained so until the last thirty-six hours of his admission. He maintained this status for about two weeks. The striking features at this time were apathy, weakness, persistent anemia and leukocytosis. A rounded nontender mass was palpated far laterally in the right abdomen, just above the iliac crest. Several thoracenteses were done on the right, which always yielded clear, straw-colored fluid with 53 polymorphonuclear leukocytes, 21 lymphocytes and 125 red cells per cubic millimeter. No organisms were present in a smear and none were grown out in culture. After about forty days in the hospital his circulation was much improved. His congestion was in abeyance, but he remained weak, apathetic and gaunt in appearance. There was fluid at the right base, with a widespread friction rub over most of the right chest. The latter finding was a new development. A chest x-ray film at this time revealed that there was considerable decrease in the congestive changes previously noted

in the lung fields. There was, however, still some prominence of the peripheral vessels bilaterally, and there may have been a minute amount of residual fluid at the right base. An anteroposterior view of the upper abdomen showed the right liver edge to be rather low in position.

Shortly after this the patient began to complain of some difficulty in swallowing. This was rather persistent. It was most commonly associated with the ingestion of pills. It was described as discomfort beneath the lower third of the sternum and under the right lower ribs. This sometimes seemed to be relieved by gelusil and at other times subsided spontaneously. These symptoms were persistent enough so that after two months of hospitalization, in spite of the patient's precarious position, a gastrointestinal series was done. He was examined in the recumbent posture and with only a minimal amount of time spent because of his cardiac status. There was no gross evidence of involvement of the esophagus, stomach or duodenum. About three weeks after the onset of difficulty in swallowing the patient began having intermittent attacks of right-upper-quadrant discomfort radiating laterally. This was frequently accentuated by deep breathing. Pain was only transitory, however, and was relieved spontaneously. The patient again associated the onset of this pain with the ingestion of the pills that he was taking. A complete physical examination at this time revealed fluid in the right chest, and some coarse, moist rales at the right base. The left chest was clear and resonant. The heart sounds were not changed. The abdomen was soft and flat. The liver was palpable, as was the rounded mass in the right lateral quadrant. It was still not clear whether this mass was a part of the liver or a separate entity.

On the seventy-sixth hospital day, while sitting up in a chair in his room and within a few minutes after swallowing two pills of enteric-coated sodium chloride, the patient complained of severe, excruciating pain in the upper mid-abdomen radiating toward the right lower costal margin. This pain increased in severity. The patient became cold and sweaty. The blood pressure was 150 systolic, 90 diastolic, the pulse 90 and regular, the respirations 25, and the temperature 99°F. The neck veins were flat, and the lungs were normal except for dullness at the right base. The heart sounds were not changed. The abdomen was rigid, particularly in the upper half. Peristalsis was absent. The pain was made worse by the supine position and was relieved by sitting up. Respiratory excursion was limited by the pain. The femoral pulses were normal. The white-cell count was 31,600, with 75 per cent neutrophils. The serum amylase was 33 units. Signs of peripheral collapse became more apparent. A plain film of the abdomen in the supine and upright positions revealed no air under the diaphragm.

An exploratory laparotomy disclosed no abnormalities in the stomach, biliary tract or small or large intestine. For the first twenty-four hours the patient rallied from operation with surprising stamina. The abdominal pain was relieved. He complained of some sharp pain in the left axilla aggravated by breathing. He was alert and in good spirits. The temperature rose to 102°F., and the pulse and respirations became more rapid. Thirty-six hours later, he began to fail. The pulse became weak and thready, and the respirations increased; the temperature rose to 106°F. There were absent breath sounds and diminished resonance over the entire left chest. There were no rales. The heart sounds were of good quality, but the rhythm was grossly irregular. The blood pressure was 140 systolic, 60 diastolic. The abdomen was soft and not distended. He died about forty hours after operation.

Differential Diagnosis

Dr. Edward D. Churchill: The first admission seems to have been an episode of myocardial infarction. The history is quite typical. The patient was brought into the hospital and stayed five weeks, and the infarction was confirmed by electrocardiographic findings — in fact, localized as a recent anterior myocardial infarct. I see nothing in the first admission that is not fully accounted for by that diagnosis, which apparently was the discharge diagnosis. It might be well to note that the white-cell count is recorded as 20,800, in association with this lesion. He was able to be up and around his home for about two months, and then the dyspnea increased and was uncontrolled by digitalization. The second hospital stay was a very long one; in fact, the terminal events started on the seventy-sixth day of residence. The former diagnosis of anterior myocardial infarction was confirmed by electrocardiogram, and the lesion was classified as "healing." The heart was enlarged, both to the right and to the left. There was bilateral pulmonary edema, and pleural effusion on the right. Venesection and a low sodium regimen appear to have been indicated, and apparently the situation was assayed as congestive heart failure with recurring episodes of pulmonary edema. Some of these were serious, since it is stated that only strenuous and heroic therapy finally led to improvement. The patient showed anemia and a hemoglobin of 9.5 gm. and still had an elevated white-cell count. The kidney function seems to have been satisfactory. The venous pressure was elevated, and the chest was aspirated several times.

During the second admission, increasing abdominal symptomatology was apparent. On the nineteenth day, he complained of epigastric fullness, discomfort and hiccups, with abdominal distention. The leukocytosis and fever appeared to center on a secondary infection, and colon bacilli and beta-hemolytic streptococci were cultured from the urine.

He was treated with sulfonamides and finally streptomycin, and the fever subsided and remained normal until the terminal event. This was puzzling to the medical attendants as shown by the sentence: "The striking features [even when the temperature was brought down to normal] . . . were apathy, weakness, persistent anemia and leukocytosis." Then the observation was made that a round, nontender mass could be palpated far laterally in the right abdomen, just above the iliac crest — in other words, in the region of the appendix. That completes the grouping of a series of findings that pointed to something below the diaphragm. Previously, everything was associated with myocardial insufficiency and myocardial infarction. At this point, it is noted that a few days later a widespread friction rub was heard over the right chest. That was a new development, and came despite the fact that the pulmonary congestion was diminishing. A mass in the right lower quadrant, a friction rub over the right chest and persistent leukocytosis immediately raise the question, Did this man, during a period of cardiac decompensation, insidiously develop an appendiceal abscess with extension to the subphrenic space? Perhaps the fluid in the right chest is not explainable on the basis of cardiac decompensation. It may have been inflammatory. The fluid itself, taken from the right side, was clear and straw colored but did show 53 per cent polymorphonuclear leukocytes per cubic millimeter and remained sterile. It would be perfectly consistent with an inflammatory fluid in contrast to that from passive congestion. So I have no doubt that the constellation of events caused worry and discussion, because a man of sixty-five will sometimes, right under our eyes on a ward, develop an appendiceal abscess, showing very little reaction. Certainly, that is one of the first things that a palpable mass in the right lower quadrant suggests. There are many other happenings that could have caused the fluid in the right chest in addition to cardiac failure. Pulmonary infarction would have accounted for this completely, but I take it that there was no evidence by x-ray film of pulmonary infarction; in fact, the radiologist says that the lungs looked clearer than they had for two weeks.

Then a new symptom appeared – difficulty in swallowing, particularly noticed in swallowing pills. There was also discomfort below the lower third of the sternum and under the right lower ribs. I take it that this was intermittent but persistent enough, so that despite the fact that the patient was very sick he was taken to the x-ray department for investigation. A great many reservations were made about the findings. It is stated that the patient was examined in the supine position. Obviously, he was very ill, and the roentgenologists want us to know that they did not have complete confidence in the results of the examination. Dr. Wyman will comment later. The abdominal symptoms again come to the fore. After about three weeks with the difficulty in swallowing, there began to be right-upper-quadrant discomfort radiating laterally, not very severe, apparently, or very disturbing to the patient. Again, it was the pills that were annoying him and seemed to bring on right-upper quadrant pain. Still no explanation was found. The liver edge was down, as one would expect with cardiac failure, with peripheral congestion and high venous pressure. The rounded mass in the right lower quadrant was still palpable. Again, reservations are thrown in: the examiners were not sure whether it was liver or a separate mass, although the story does not quite hang together; the liver edge was described as palpable just below the costal margin, and the mass was at the iliac crest.

An acute episode ushered in the terminal event on the seventy-sixth hospital day. The patient was sitting up in a chair in his room when he was given some more pills (enteric-coated sodium chloride). Severe, excruciating pain was felt in the upper mid-abdomen, radiating again toward the right and along the costal margin. This pain was more severe than any he had had before, and was followed by peripheral vascular collapse. The abdomen is described as being rigid, particularly in the upper portion. Peristalsis was audible, and he was much more comfortable while sitting up than when trying to lie down. Respiratory excursions were limited by pain. Apparently, his physicians worried about embolism and carefully ascertained, as far as the femoral arteries were concerned, that the circulatory pathways were not blocked. The white-cell count was high, but this was always a fairly constant finding in this case. Peripheral collapse was not severe at the onset because he was running a blood pressure of 150 systolic, 90 diastolic, and a pulse of 90, but it increased, and he was examined for a perforated viscus by inspection for air under the diaphragm. Operation was performed, apparently in the belief that an acute abdominal crisis had occurred. Lo and behold, no disease was found at operation! It is definitely stated that there were no abnormalities in the stomach or biliary tract or in the small or large intestine. If we accept that statement at its face value, we must rule out the tentative diagnosis of appendiceal abscess. So, I see no justification in entertaining the somewhat attractive idea that this man had a smoldering appendix with subphrenic-space infection. Certainly exploration during life is nearly as accurate as exploration at autopsy, and we have to keep on the beam of the evidence as given to us. After the operation, the examiners appear to have been somewhat surprised that the patient staged a comeback and complained no longer of abdominal pain. Perhaps he had medication, or other ancillary treatment, and forgot about it; but he had other events to worry about. A sharp pain appeared in the left

axilla and was described as pleuritic. The pulse and respirations were more rapid. He then went into a tailspin of peripheral vascular collapse, the temperature rising to 106°F. There were terminal atelectasis and aspiration pneumonia, presumably, of the left lung associated with pleuritis, completely irregular cardiac rhythm and death forty hours after operation.

Dr. Wyman, will you give any x-ray evidence that you have on this obscure case?

DR. STANLEY M. WYMAN: The first two films taken at the first admission show bilateral pleural effusion. The heart is large but without characteristic configuration. There is rather pronounced engorgement of the hilar and pulmonary vascular shadows. The next film, taken a month later, shows what is probably a large collection of fluid in the right pleural space and a hazy ground-glass density overlying both lung fields centrally, consistent with edema. A little more than three weeks later the lung fields have cleared very definitely, and the fluid in the right pleural space also appears to have decreased considerably. Taken on the same day is this film of the upper abdomen.

DR. CHURCHILL: This is at the time he was sent down in a search for a cause of the difficulty in swallowing?

DR. WYMAN: No, this is a month before that: this film shows the liver margin extending down close to the iliac crest.

DR. CHURCHILL: Could that have been the mass that was felt?

DR. WYMAN: I should think so, but I should think the tip of the liver would have been recognized.

DR. CHURCHILL: The examiners did not know whether it was liver or not.

DR. WYMAN: There is nothing particularly diagnostic on these films. This is the film after barium was given in an attempt to explain the difficulty in swallowing. It shows no gross abnormality in contour or position of the lower esophagus, stomach or duodenum. The next films are taken approximately a month later, and the liver shadow appears to have increased in size still further and is now overlying the upper portion of the right ileum. I do not recognize any definite bone metastases or any abnormal soft-tissue shadows. The kidney outlines are fairly well seen.

DR. DANIEL S. ELLIS: What is the shadow overlying the eighth dorsal vertebra?

DR. WYMAN: I think that is an artifact. It may well be a pill.

DR. CHURCHILL: In doing the fluoroscopy, did they get a look at the full length of the esophagus?

DR. WYMAN: I would assume so from the description. I believe the fluoroscopist probably had his best look at the esophagus. That usually is the case in a gastrointestinal series on a person as sick as this. One can see the esophagus quite well. It is more difficult to see the stomach and duodenum.

DR. CHURCHILL: But you do not see any x-ray evidence of, let us say, cancer of the esophagus obstructing the swallowing of pills?

DR. WYMAN: The only evidence is the fluoroscopist's word. There is no evidence for or against it on the film.

DR. ELLIS: How much fluid is there in the left chest?

DR. WYMAN: The film was taken with the patient lying down, and I can see no evidence except a small quantity in the costophrenic sinus. I think he had a small amount. There may be more posteriorly, which I cannot see.

DR. CHURCHILL: There is one major question we might as well try to resolve on the evidence: Did this man have intra-abdominal disease? What kind of intra-abdominal disease could be overlooked at a laparotomy forty hours before the patient died of it? It seems to me that we have to follow the record here. It is stated that there were no abnormalities in the biliary tract. Does that include the liver?

DR. ELLIS: It was an entirely negative exploration except for slight congestion and enlargement of the liver.

DR. CHURCHILL: Otherwise nothing was seen or felt in the abdomen?

DR. ELLIS: That is right.

DR. CHURCHILL: He was operated on within a few hours of the episode of collapse?

DR. ELLIS: Four hours.

DR. CHURCHILL: There is one question we should ask ourselves: Could a mesenteric thrombosis or an occlusion of the celiac axis have been present without changes visible to or palpable by the surgeon four hours after it occurred? I should think not. A lesion of the mesenteric vessels that causes death in forty hours would show some duskiness or lack of pulsation in the mesenteric arteries at four hours. So it seems to me, as the evidence stands, that we must accept the physical findings of laparotomy as ruling out the acute abdominal crises that may be expected to occur with hypertensive cardiac failure. We must also rule out completely the somewhat tempting idea of appendiceal abscess, with liver or subphrenic-space abscess, because the surgeon in exploring this man would certainly run his hand up over the dome of the liver. We must also rule out perforated viscus, volvulus and other acute abdominal emergencies.

We then come to a discussion of acute and fatal episodes that might be linked with the difficulty in swallowing and cause pain, excruciating in nature, in the epigastrium. There is one very rare entity —namely, rupture of the esophagus. With rupture of the esophagus all the signs and symptoms of an acute abdominal emergency may be present, and abdominal exploration if carried out will be negative. Is it possible that when swallowing these large pills the patient tore the lower end of his esoph-

agus? Cases of rupture of the lower thoracic esophagus, as I say, are rare, but they have been diagnosed occasionally in life. It seems to me that we are left with that as the one possible solution. Was this rupture of a normal esophagus or extension of infection by trauma to an ulcer of the esophagus or perforation of cancer of the esophagus? It seems to me that we have to accept the findings of the fluoroscopist that there was no cancer of the esophagus causing obstruction to swallowing. However, he might have overlooked a small ulcer. Things happened so rapidly at the end and were so characteristic of an acute emergency that it does not seem possible to say that the patient died of another myocardial infarction. The heart sounds were of good quality, although the rhythm was grossly irregular.

The only suggestion I have to offer from the surgical point of view is that of rupture of the lower thoracic esophagus. It could have proved fatal in about forty hours and not have been disclosed at laparotomy. I will leave to Dr. Ellis whether the terminal event here could be interpreted simply as another major myocardial infarction. Obviously, the medical attendants did not think so, or they would not have called the surgeons to operate.

Dr. Benjamin Castleman: How do you account for the chronic abdominal pain?

Dr. Churchill: I do not account for it.

Dr. Castleman: It would have nothing to do with the final diagnosis?

Dr. Churchill: I would like to account for it, but with a completely negative examination of the abdomen by laparotomy a few hours before death I do not believe one has any basis to account for it.

Dr. Ellis: The protocol was as complete as we could make it, so I have very little to add. In retrospect, I think that some of the discomfort in the right chest, which we had been attributing purely to encroachment on the lung by fluid, may have been due to something else. On the other hand every time we tapped the right chest the patient was relieved of the discomfort. With regard to the cell count of the chest fluid, though leukocytes were present there were never many cells, and we had no idea that anything else was going on other than right hydrothorax, on the basis of cardiac failure. No further cell counts were done until after the third tap, which showed a negative culture.

The mass described was thought by one examiner at one time to be the liver and at another time a separate entity. The uncertainty was caused by the abdominal distention. I personally came to believe that it was a long tongue of liver extending down laterally and was a part of the liver and probably not any other mass.

As far as the terminal episode is concerned, with the negative exploration we were just as much puzzled as Dr. Churchill. We, of course, considered the possibility, as we had done before operation, that the episode was caused by another myocardial infarct, but we ruled that out because the heart sounds remained good and the electrocardiogram the next day showed no further evidence for infarction. I believe that the terminal picture was due as much to a massive collapse of the left lung superimposed on his weakened myocardium as anything else. The temperature of 106°F. pointed to a superimposed element of infection. But I doubt very much if this patient could have survived the massive collapse and everything else he had. That was the thing that tipped the picture: if he did not have massive collapse I doubt if he would have died as soon as he did. I would like to ask Dr. Churchill if perforation of the esophagus could have occurred forty hours before death. If so, how does he explain the anemia, the persistent white count from the time of admission and the weight loss?

Dr. Tracy B. Mallory: Can you go any farther, Dr. Churchill?

Dr. Churchill: I cannot explain past events because I am accepting verbatim the completely negative findings in the abdomen. There are many unexplained features in this case. I see no group of symptoms, however, or findings that point toward any other specific diagnosis.

Dr. Ellis: I might say that we operated with a diagnosis of perforated peptic ulcer and thought that was what we were dealing with.

Clinical Diagnoses

Massive collapse, left lung.
Myocardial infarct, with congestive heart failure.
Dissecting aortic aneurysm?

Dr. Churchill's Diagnoses

Perforation of thoracic esophagus, with mediastinitis and pleuritis.
Old myocardial infarction.
Hypertensive heart disease, with cardiac decompensation.

Anatomical Diagnoses

Ulcer of esophagus, with perforation into mediastinum and left pleural cavity.
Subacute mediastinitis.
Empyema, left, acute.
Massive collapse, left lung.
Coronary thrombosis, old.
Myocardial infarct, old.
Duodenal ulcer, active, penetrating.

Pathological Discussion

Dr. Mallory: I will show a lantern slide demonstrating the major finding, which Dr. Churchill

correctly predicted. There was a perforation of the esophagus, which can be seen at this point where the toothpick has been inserted through an orifice measuring 9 by 13 mm. We found nothing suggesting that there had been a diverticulum at that spot, and we do not see in the microscopical sections the evidence of peptic ulceration that one sometimes sees in esophageal perforation, so we cannot state what the etiology of the ulcer was. There was a considerable amount of purulent infiltration throughout the mediastinal tissues, which we classified as subacute. I am not able to give a very exact estimate of its duration. At the time of autopsy the ulcer communicated directly through into the left pleural cavity, and there was a very fresh empyema on the left. The mediastinitis was certainly of longer duration, so I would assume that the ulceration had occurred in two stages, an initial penetrative into the mediastinal tissues producing mediastinitis, and a second one, when the process broke through into the pleural cavity, which accounted for the terminal episode of collapse. There was an old myocardial infarct that had been correctly placed by electrocardiographic evidence and at the time of autopsy was completely fibrous and healed, with evidence of fresh extension. The left descending coronary artery showed completely occlusive organized thrombus. The mass in the right lower quadrant was an abnormal knob, which extended from the lower margin of the right lobe of the liver, simply an anomaly in the shape of the liver.

We did find one intra-abdominal condition that may have been responsible for a significant portion of the symptoms, a penetrating ulcer of the posterior wall of the duodenum backing up against the pancreas. It could certainly have been responsible for the anemia and for some of the pain. It is one of the easiest of intra-abdominal conditions to overlook at even a very careful exploratory operation.

Dr. Ellis: The patient's stools were repeatedly guaiac negative.

Dr. Jacob Lerman: I would like to suggest the possibility that some of the chronic abdominal pain was due to hypocalcemia and hyponatremia as is seen in Addison's disease for example.

Dr. Mallory: The possibility I cannot rule out, although I think we have two adequate anatomic explanations for it.

Dr. Churchill: I think the combination of a duodenal ulcer and an ulcer in the esophagus might have caused it. The ulcer of the duodenum was penetrating the head of the pancreas.

Dr. Ellis: You do not think that the pills, the enteric-coated salt, had anything to do with perforating the esophagus do you?

Dr. Mallory: I would hate to be challenged in court on that.

CASE 35232

Presentation of Case

First admission. A fifty-five-year-old single schoolteacher was admitted to the hospital because of pain in the left flank.

One week before admission she awoke with severe pain in the left flank. The pain did not radiate and was steady. At the onset there were five loose bowel movements, but following this the bowels were normal. The bowel movements aggravated the pain. The pain remained severe for one day and then slowly diminished. She was admitted for study.

The temperature, pulse and respirations were normal. In the lower abdomen there was generalized tenderness most marked on the left. A tender mass was felt arising from the pelvis. A barium enema demonstrated multiple diverticula, most numerous in the region of the upper sigmoid, where there was marked spasm; there were streaks of barium extending outside the lumen of the bowel on its medial aspect. In the region of the gall bladder there were three ring shadows, which a Graham test proved to be in the gall bladder. The dye concentrated normally.

A gall bladder full of stones was removed. The common duct was explored and was normal. Convalescence was uneventful.

Second admission (ten years later). In the interval the patient remained on a low roughage diet and mineral oil. There was no change in bowel habit. She occasionally noticed an increased feeling of gaseousness, especially after eating, and this was often relieved by passing of gas or a bowel movement.

Five days before admission the patient was awakened by a sudden, severe pain in the left upper quadrant that spread across the abdomen. She

believed that passing gas might relieve the pain. She fainted twice and her doctor found a large mass in the left upper quadrant and severe left-costovertebral-angle tenderness. Several hours later the doctor found the mass to be smaller. There was no nausea. The pain subsided and did not recur. Bowel movements did not change during the days preceding admission and the appetite remained fair.

Physical examination of the heart and chest was negative. In the left upper quadrant there was a definite sense of increased resistance with a questionable, tender mass. There was spasm and some costovertebral-angle tenderness. Examination of the urine was negative.

The temperature, pulse and respirations were normal.

An intravenous pyelogram was reported as follows:

> Preliminary films show a small patch of density adjacent to the superior aspect of the left pelvic aperture, which may represent barium outside the colon from a previous examination or is possibly still present in a diverticulum of the sigmoid. There is evidence of a mass in the left mid-abdomen, which is rather vaguely made out but appears to measure at least 10 cm. in its greatest dimension. The left psoas muscle is just visible through the density of the mass although it is not well defined. The inferior pole of the left kidney is likewise just barely visible. There is no definite evidence that the mass is associated with the kidney, although the likelihood is not entirely excluded. The opaque medium is excreted promptly by both kidneys in good concentration outlining essentially normal-appearing renal calyx, pelvis and ureters, except for a suggestion of slight displacement of the proximal left ureter medially. A barium enema shows multiple diverticula in the region of the sigmoid and a lesser number in the distal transverse and descending portion. There is evidence of encroachment by the mid-abdominal mass upon the descending colon and distal transverse colon.

A gastrointestinal series was negative except for a hiatus hernia. The body of the stomach and proximal jejunum were displaced toward the midline by the previously described mass. There was no evidence of splenic enlargement.

An operation was performed.

Differential Diagnosis

Dr. Walter E. Garrey: The first admission seems to be a clear-cut story of a flare-up of diverticulitis of the sigmoid with perforation, apparently well walled off. During the course of interpreting these abdominal films three ring shadows were demonstrated that were evidently gallstones. Some time later (I suppose time was allowed for the diverticulitis situation to improve), an operation was performed, and a gall bladder full of stones was removed. The surgeon evidently found small stones as well as large, round ones, and he explored the common duct and found that it was normal. That was over ten years before the second admission, so I suppose the films are not available. The patient had an uneventful convalescence and got along well for ten years.

Then she came back with a different story, at the age of sixty-five. She had been advised to maintain herself on a low roughage diet and had taken mineral oil. We are not told about leukocytosis or the total blood count and smear. Both were noncontributory, I judge, and I also judge that the temperature was normal during the period that followed entry.

There was x-ray evidence of encroachment by a large abdominal mass on the descending colon and the distal transverse colon. I hope for further amplification of the word "encroachment." I want to know if Dr. Wyman can see any evidence of mucosal involvement of the bowel itself by this mass or whether it really means that the position of the mass was such that it had altered the position of the transverse and the descending colon. I would particularly like to know whether any lateral films were taken, either during barium enema or lateral oblique films during the pyelogram.

May we see the x-ray films? I do not have much of a clinical story and I cannot feel the mass, so I have to depend a good deal on what help I can get from the x-ray studies.

Dr. Stanley M. Wyman: The plain film of the abdomen as described in the protocol shows the indistinct border of the left psoas muscle. There is a sense of increased density overlying this area, which cannot be accurately outlined. The left kidney lies definitely lower than usual, and I think that this lower pole is more medially placed than the right and certainly more medially than is commonly seen. There is also some displacement of the upper ureter as suggested in the protocol. This is the area of unusual density described on the plain film, which was thought to be barium from previous examination. Three films of the barium enema show extensive diverticulosis in the sigmoid, descending colon, and distal transverse colon. The mass

lies in this area and appears to displace the colon without involving it. This film was taken with the left side raised in oblique projection, and shows that the mass lies well posteriorly. The two films from the upper gastrointestinal series show again a mass displacing loops of jejunum medially. I think there is a hiatus hernia but nothing more that I can be sure of. Incidentally, from the previous story I believe that this shadow of barium actually is a small extravasation adjacent to the colon.

DR. GARREY: The x-ray studies have been helpful. From the protocol I certainly had no very clear idea whether we were dealing with an intraperitoneal mass or a retroperitoneal mass, and if a retroperitoneal mass whether or not it was extrarenal.

I think we can begin our discussion by eliminating certain possibilities that seem unlikely. I would eliminate first of all primary renal tumor on the basis that all the renal calyxes are seen, and that there is no demonstrable distortion of any renal calyx. I would think, then, that, while we cannot be absolutely sure that this mass was not associated with structures near the root of the mesentery, the lateral film here suggests that it had its origin far posteriorly, and that it probably was a retroperitoneal mass, rather than a mass in the root of the mesentery. I would have liked to see, for a retroperitoneal tumor, a little more displacement or distortion of the kidney, either by rotation or by displacement of the ureter, than is demonstrated here, but, still, there apparently was some. I would eliminate any connection between this mass and the previous diverticulitis. I think it is unlikely that this mass had resulted from a perforation posteriorly. In the first place the diverticula are usually along the other border of the bowel. We are not told that she ran a temperature or leukocytosis. When we do come down to the question of what sort of retroperitoneal, extrarenal mass this might have been, there are legions of tumors that occur in this area. Many of them probably have their origin in the structures along the urogenital ridge and may have a variable histology. They may be embryonal-cell carcinoma or various tumors or may show mixed histology. This might be a fibroma or neurogenic sarcoma or fibrosarcoma. It seems to me too laterally placed to be derived from lymph-node structures, and I doubt that it was any of the malignant lymphoma series. Could it have originated from an adrenal rest or from the adrenal gland itself? There are large adrenocortical tumors that are found in this retroperitoneal flank area, and they do not, by any means, show endocrine stigmas on the surface of the body. However, one would expect that the kidney would be displaced downward if this were adrenocortical carcinoma, and I think that is unlikely. Was this mass tender? Why did this patient have acute pain for a while? The best hypothesis, I think, is that in some way the encroachment of this mass on the bowel with narrowing of the bowel caused some transient distention of a hollow viscus even though she did not vomit, and the exacerbation of pain that came and went was on that basis.

I will venture to say that the operating surgeon was not very sure of exactly what kind of tumor he was going to find, or whether it could be extirpated and cured. I would like to know what the preoperative diagnosis was. I take it that no bruit was heard with a stethoscope in this mass and no pulsation made out, or such a finding would have been indicated in the protocol.

In summary, I would eliminate any infectious process and would eliminate aneurysm and would come back to a solid tumor, which I believe to be a retroperitoneal rather than an intraperitoneal one. But I would simply say that the exact histology of such a mass is usually not predictable until the time of biopsy or excision, but from the general shape of this thing one might expect it to be an embryonal-cell carcinoma or one of the spindle-cell tumors, neurogenic sarcoma or fibrosarcoma. I take it that the possibility of a secondary implant from something in the pelvis is pretty well ruled out by adequate pelvic or rectal examination, and in a woman, of course, the extremely common situation of metastasis from a small tumor in the testicle is eliminated.

DR. CLAUDE E. WELCH: Dr. Wyman, is the shadow of the spleen discernible on the films?

DR. WYMAN: I think it lies in this region; it is not remarkable.

I do believe, Dr. Garrey, that the left kidney lies lower than usual.

DR. GARREY: That could bring us back to primary adrenal neoplasm, but it seems to me that the kidney is not displaced very far down. It is probably lower than the one on the right. It is rotated. That would be further evidence for a retroperitoneal extrarenal lesion. I would like to revise my assump-

tion and bring in another structure as a possibility, although I think it is unlikely — namely, something in the tail of the pancreas. It seems to me that the whole shape and delineation of this thing is down farther than a pancreatic cyst or tumor in the tail of the pancreas would be, and I am accepting the x-ray statement that the shadow of the spleen could be seen to rule out cyst of the spleen. I do not believe that would be nearly so likely to displace the kidney downward, and it brings me back to whether this might be an adrenal tumor or sympathicoblastoma originating in the adrenal area. I can only say that it is a possibility.

Clinical Diagnosis

Retroperitoneal tumor.

Dr. Garrey's Diagnosis

Left retroperitoneal extrarenal tumor, either embryonal-cell carcinoma or neurogenic sarcoma or fibrosarcoma.

Anatomical Diagnosis

Perirenal hematoma.

Pathological Discussion

Dr. Howard Ulfelder: As Dr. Garrey so wisely predicted, we contented ourselves with a preoperative diagnosis of retroperitoneal tumor and did not believe the evidence warranted being more specific than that, although I personally thought it might arise from the pancreas. This patient was explored through a transverse incision in the left upper quadrant directly over the mass. The peritoneal cavity was free of any abnormality. The descending colon was pushed forward and ran over a retroperitoneal tumor, which was about as large as a baseball. Palpation of this tumor showed that the peritoneum was freely movable over it, and there were a number of large vessels crossing it. It seemed to be in continuity and inseparable from the left kidney. It was my impression that we were dealing with a tumor of the lower pole of the left kidney, and therefore the incision was extended laterally and upward to remove the distal portion of the tenth rib and expose the retroperitoneal space after incision of the diaphragm. This allowed easy dissection of the tumor and kidney as one mass; the ureter was transected well below it, and it was then completely free except for the pedicle. The renal vein was normal to palpation; we transected it just distal to the left ovarian vein. The renal artery was cut, and the mass removed in one specimen and sent to Dr. Mallory.

Dr. Tracy B. Mallory: The specimen that reached the laboratory showed a kidney embedded in a very large amount of hemorrhagic perirenal fat. The kidney was absolutely normal. The surrounding fat showed multiple dissecting planes of hemorrhage all through it and a few small foci of early fat necrosis.

The diagnosis, I think, is still somewhat questionable. In a woman of sixty-five asymptomatic rupture of a retroperitoneal vessel is a good possibility. We have on many occasions seen apparent acute abdominal emergencies from rupture of the hypogastric artery, simulating closely an attack of acute appendicitis, and I think in all probability rupture of an unidentified vessel in the perirenal tissues was the source of this hematoma. An outside possibility might be pancreatitis at the extreme tail of the pancreas. That was suggested by the small foci of fat necrosis, but there was nothing else to suggest it in either the clinical history or the anatomical findings. I think apoplexy of an unidentified perirenal artery was probably the cause of her symptoms.

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THE ANNUAL MEETING

The Massachusetts Medical Society has celebrated its one hundred and sixty-eighth consecutive annual meeting. The record may be mentioned with pardonable pride as unparalleled in this country; the New Jersey Society began its existence in 1766 but held no meetings from 1775 to 1781, when the country was otherwise engaged, and again suspended operations between 1795 and 1807. The total registration was 1454, of which 1230 were physicians.

The Council met on the evening of May 23 at the Hotel Sheraton, in Worcester, with an unusually large attendance. At this meeting three new sections were voted into existence: a section on psychiatry and neurology, one on ophthalmology and otolaryngology, and one on industrial health.

A considerable amount of business was dispatched during the course of the evening. The Executive Committee was upheld in its disapproval of the annual registration of physicians, and a co-ordinating committee to work with the American Medical Association in publicizing the advantages of voluntary over compulsory health insurance was approved.

The fourteen proposals for improving the distribution of medical care, adopted on February 9 by the committees on Medical Economics and Public Relations, were earnestly discussed. Proposal 13, agreeing that the federal Government should "subsidize medical and nursing education, medical indigents, health and diagnostic centers, including mental, where not now adequate," was referred back to the committee for clarification. The remaining proposals were accepted with suitable modifications.

Under an amendment to the report of the Committee on Ethics and Discipline pertaining to a code of ethical conduct for physicians and institutions in their public relations, the appointment of a committee of five to draw up such a code was approved.

After debate the organization of not more than five pilot health-protection clinics in pivotal localities in the State as recommended by the Department of Public Health and the Committee on Public Health was approved.

The following officers were elected for the ensuing year: president, Dr. Arthur W. Allen; president-elect, Dr. Leland S. McKittrick; vice-president, Dr. Albert A. Hornor; secretary, Dr. H. Quimby Gallupe; treasurer, Dr. Eliot Hubbard, Jr.; assistant treasurer, Dr. Norman A. Welch; orator, Dr. John W. O'Meara. It is a pleasure to welcome Dr. Allen to his post and to rest secure in the knowledge of his ability to discharge its manifold functions.

The general sessions, constituting a well rounded program of clinical and scientific papers, were held in the Little Theater of the Worcester Memorial Auditorium beginning on the morning of May 24, and continuing through May 26.

The annual meeting of the Society took place also on the morning of May 24 and was highlighted by the President's report on the state of the Society, the awarding of prizes to three medical students and the annual oration.

As previously instructed by the Council, the Committee on Medical Education, on nomination by the deans of the three medical schools in the Commonwealth, had selected a fourth-year student from each school "who best exemplifies those intangible qualities which serve to designate him as the good physician." These students were Sylvan B. Baer, of Boston University School of Medicine, Henry S. Harvey, of the Harvard Medical School, and William H. Ellswood, of Tufts College Medical School. They were presented with suitably bound and illuminated autographed volumes of the George R. Minot Symposium on Hematology. It is hoped that the presentation of these deturs may become an annual event.

The oration of the year, appearing as the leading article in this issue of the *Journal*, was delivered by Dr. C. Sidney Burwell, dean of Harvard Medical School, on "Some Responsibilities of Medical Education."

Among the changes in the by-laws ratified at the annual meeting was a new section providing for the creation of an advisory board to the President, consisting of the five most recent past presidents of the Society.

The Woman's Auxiliary of the Society was simultaneously holding its first annual meeting at the Worcester Woman's Club. The following officers were elected for the coming year: president, Mrs. Charles E. Ayers, of Worcester; president-elect, Mrs. Howard F. Root, of Brookline; first vice-president, Mrs. George F. Wilkins, of Brookline; second vice-president, Mrs. Roy W. Layton, of Melrose; recording secretary, Mrs. Claude E. Welch, of Belmont; corresponding secretary, Mrs. John F. Conlin, of Boston; treasurer, Mrs. Edward L. Peirson, of Salem. Mrs. Leighton Johnson, the retiring president, is to be congratulated on the progress that the Auxiliary has made during her administration.

On the morning of May 25 the Shattuck Lecture, which has already appeared in the *Journal* of May 26, was delivered by Dr. Paul D. White of Boston on the subject "La médecine du coeur." In the evening, at the annual dinner, Roscoe Pound, LL.D., university professor emeritus of Harvard University and former dean of the Harvard Law School, delivered an address on "The Professions in the Society of Today."

A singularly happy event on this occasion was the presentation to Dr. James C. McCann of a memorial from the Society, in recognition of the great service that he has rendered to the practice of medicine as president of Massachusetts Medical Service.

In the planning of the program and the excellent arrangement of the exhibits, great credit is due to the state and local committees of arrangements.

THE DOCTOR AND THE MEDICAL LIBRARY

THE organization of the Associates of the Yale Medical Library, extending to physicians in Connecticut borrowing privileges formerly reserved to those connected with the School of Medicine, indicates a growing awareness of the value of the medical library in medical education. All doctors in Connecticut, as well as all Yale medical alumni, have been invited to become members of the group, whose purpose is to maintain and augment the present medical collections and to extend their usefulness to the medical community at large; for expansion of the facilities and services of the Library, the Associates are required to pay a small annual subscription fee and are urged to contribute books and other material. The response to this invitation has been encouraging. Both Yale University and the officers of the Associates deserve credit for making this excellent collection available to doctors in Connecticut.

A similar association of the Boston Medical Library and the Massachusetts Medical Society has enabled physicians in Massachusetts to share the benefits of an outstanding medical collection.[1] The annual report of the Librarian, printed elsewhere in this issue of the *Journal*, points out the increased use of the facilities of the Library in 1948, apparently owing to the extension of borrowing privileges to members of the Society. In return, the allocation of a part of the dues of Society members has provided vital financial support for the Library. This additional income, although welcome, is not sufficient to enable the Library to make the repairs and alterations in its plant that are essential to maximum efficiency: the Library still lacks the $75,000 for the erection of new stacks.[2]

The doctors in Connecticut and Massachusetts may well be proud of their support of these institutions whose contribution to medical education is so great. It is to be hoped that the funds essential to continued and expanded usefulness will be provided by those who benefit most from the opportunities offered: the physician who is doing research on an important project for which the records of previous work are essential; the writer of medical articles who wishes to make an adequate survey of the literature on the subject concerned; and the doctor, specialist or general practitioner, who desires to keep abreast of medical progress in his own and related fields. A small contribution from each would guarantee continuation of privileges that might be considered a generous return on a wise investment.

References

1. Editorial. Budget for 1949. *New Eng. J. Med.* **239**:155, 1948.
2. Editorial. *Ex libris*. *New Eng. J. Med.* **240**:271, 1949.

THERE'LL ALWAYS BE AN ENGLAND

An annotation, according to the latest ruling of Webster, is a note added by way of comment or explanation. The annotation, as featured in the *British Medical Journal* or *The Lancet*, is by way of being a minor editorial in that it sometimes reflects the editor's views. The full-dress editorial in the *British Medical Journal* or *The Lancet*, is a leading article. An annotation in certain American journals is classed as current comment. Other journals employ the same form without classification — a relatively safe maneuver.

A fascinating annotation, in *The Lancet* of January 15, 1949, considers the various aspects of the writing of a report, as discussed at a meeting of the section of epidemiology of the Royal Society of Medicine. Writing is defined by one authority participating in this discussion as a development of the art of speaking. On the type of speaker that the writer may be depends the style of his writing — if he is able to address large groups he may write for the general public; if he speaks best to an audience of one his reports should be written as though they were personal letters.

Professor A. Bradford Hill, the well known statistician, defends his own peculiar form of intellectual activity, cleaving to the table as opposed to the graph. Conclusions, however, must be in accord with the figures. As a classic discrepancy a statute of George III is quoted "which required half the penalties paid under the Act to be given to the informer and half to the poor of the parish; but the only penalty it allowed was 14 years' transportation."

Dr. A. L. Banks, apparently a disciple of the Roman military writers, maintains that the important question to be decided is whether any report is necessary at all. If the decision is in the affirmative it should be sufficiently complete to kill the subject stone dead with one blow; and that is a lesson that some American authors who spin from a subject a dozen yarns for a dozen different journals should learn.

According to another disputant, three types of reports may be considered for three classes of readers. "A report to a health committee should contain the facts and all the facts; a report to a senior officer should contain selected facts; and a verbal report to students should contain one fact repeated three times."

BOSTON MEDICAL LIBRARY

INCUNABULA AND EARLY MANUSCRIPTS

During 1948 eighteen incunabula were added to the Bullard and other collections, making a total of 715 to January 1, 1949. The collection is now the largest in a medical library in the United States and is outstanding among the collections in the country. Notable additions include a unique copy of Baldovinus Sabaudiensis, *Ars memorativa* (c. 1485); Gentilis de Fulgineo, *Tractatus de balneis* (Santorso, 1473); *Somnia Danielis* (Rome, about 1482–1488), this edition not being recorded in the United States; Dominicus de Carpanis, *De nutrienda memoria*, (Naples, about 1476); Gaspar Torrella, *Dialogus de dolore cum tractu de ulceribus in pudendraga* (Rome, 1500), an early tract on syphilis, with which is bound three early sixteenth-century tracts of Torrella; Pythagoras, *Ludus* (Padua, about 1482), not recorded in the United States; and the second edition in quarto of Sprenger and Institoris; *Malleus maleficarum* (Speir, about 1491), a popular book on witchcraft issued a number of times in the fifteenth century of which the Library now has the second to fourth editions. Dr. William Norton Bullard, who gave the Library a substantial sum for the purchase of books and manuscripts issued before 1700, was greatly interested in this subject

and presented to the Library a large collection of books on witchcraft and demonology, including a number of incunabula and early English imprints, to which there has been added the Deetjen library, with surprisingly little duplication.

The Library is interested in acquiring a representative collection of medieval and early renaissance manuscripts relating to medicine and in all the learned languages of the period. During 1948, an Arabic manuscript of the fifteenth century on drugs, one in Hebrew of the fourteenth century on personal health and one in English of the fifteenth century, comprising the receipt book of an English physician, were added to this division, which now totals sixty-two items.

COLLECTED WORKS

The Boston Medical Library has been interested for many years in the regularly published works of physicians and collections of reprints of individual authors and of institutions and has a very large division of this type of material, and is pleased to add to it as occasion offers.

Collections of writings of one or more authors are important to libraries for reference purposes and fall into a number of classes, one of which is collections of reprints of single authors. These again may be divided into two classes, of general and special interest.

Those on special subjects are in some cases very important. The Boston Medical Library has received recently the *Collected Reprints* of Dr. William G. Lennox, bound in five volumes and containing his published writings from 1919 to 1947, numbering 190 papers and monographs. Dr. Lennox is recognized as an international authority on epilepsy and allied conditions. Likewise, there are the current series of Dr. Samuel A. Levine, the noted heart specialist, 1915–1946; and that of Dr. Maxwell Finland, of the Boston City Hospital, on infectious diseases, chemotherapy and allied subjects, bound in three volumes, 1923–1945.

From time to time the Boston Medical Library receives important collections, such as the papers of Benjamin A. Broca, in five volumes, published in various places in France, 1882–1924, and presented by his widow; and a series of forty-nine papers by Pio Colombini, 1892–1910, published in Italy, and presented by an Italian friend. Dr. Lynn Thorndike, the eminent classical historian, presented to the library a series of his reprints of medical interest.

A notable general collection of reprints is that of Dr. William Osler, bound in seven volumes, 1870–1920, by Dr. Osler and distributed to libraries and friends by the doctor.

Collected works of institutions are issued by a large number of organizations. Likewise they fall into two categories, general and special. The general class is well represented by the *Reprints of the Rockefeller Institute for Medical Research*, currently published, and now in its one hundred and thirty-fourth volume (1947). In the special division may be noted the *Collected reprints of the grantees of the National Foundation for infantile paralysis*, volumes one to eight (1928 to 1947).

Another class is represented by the regularly published works of individual authors; a notable example is the *Opera omnia* of Jerome Cardan, published in ten large folio volumes at Lyon in 1663. It is said that Cardan was paid by the page for his writings, and this accounts in some way for his large output. Likewise, there is the *Opera* of Galen, issued at Venice in two large folio volumes in 1490. It is a scarce work, four copies being listed in Stillwell's census of *Incunabula in American Libraries*, New York, 1940. There are copies in Boston, New Haven and Washington, and there was one in a dealer's stock in Philadelphia. The copy in the Boston Medical Library is in mint condition, untouched by the miniaturist, illuminator or rubricator. The definitive edition, by Kuhn, was not published until 1821–1833 at Leipzig. Likewise, the scholarly edition of Hippocrates by Littré, in ten volumes, was not published until 1839–1861 in Paris.

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

GONORRHEA AND SYPHILIS — STANDARDS OF DIAGNOSIS, TREATMENT AND FOLLOW-UP STUDY

With the advice and assistance of the Advisory Committee to the Division of Venereal Diseases, the Massachusetts Department of Public Health has adopted standards for the diagnosis, treatment and follow-up study of patients with gonorrhea and syphilis who are seen in the state-co-operating venereal-disease clinics.

On the basis of the changing terminology as applied to venereal diseases and particularly to syphilis, the following nomenclature has been adopted:

I. GONORRHEA

1. Acute — with or without complications.
2. Chronic — involving the urethra (anterior and posterior), prostate, seminal vesicles, epididymis, vulva, cervix, pelvic contents, Bartholin's gland, joint, eye, meninges and other structures.

II. SYPHILIS

1. Primary — only if chancre is present.
2. Secondary — only if secondary manifestations are present and include recurrent secondary syphilis.
3. Early latent — the presence of a symptomless infection characterized by a repeatedly positive standard blood test for syphilis with negative spinal-fluid serologic findings and with a history of a primary lesion within four years, or in the absence of history of initial lesion when the patient is less than thirty years of age.

4. Late latent — the presence of a symptomless infection characterized by a repeatedly positive standard blood test for syphilis with negative spinal-fluid serologic findings and with a history of a primary lesion for four years or more, or in the absence of history of initial lesion, when the patient is thirty years of age or more.
5. Late syphilis
   A. Mucocutaneous
   B. Osseous
   C. Visceral
   D. Neurologic
      (a) Asymptomatic
         (1) Early — abnormality in the spinal fluid within four years after the primary infection in the absence of all symptoms and signs.
         (2) Late — abnormality in the spinal fluid four years or more after the primary infection in the absence of all symptoms and signs.
      (b) Acute meningitis
      (c) Chronic meningovascular
      (d) Vascular
      (e) Tabes
      (f) Paresis
      (g) Taboparesis
      (h) Gumma
      (i) Primary optic atrophy
      (j) Other types
6. Congenital syphilis
   A. Early — congenital syphilis in a child less than two years of age.
   B. Late — congenital syphilis in a child two years of age or more.

III. CHANCROID

IV. GRANULOMA INGUINALE
1. Exuberant
2. Ulcerative
3. Cicatricial
4. Other

V. LYMPHOGRANULOMA VENEREUM
1. Anorectal
2. Genital
3. Inguinal
4. Urethral
5. Other

Gonorrhea

In general, a diagnosis of gonorrhea is made on: history of exposure; clinical signs and symptoms; and positive smears and cultures.

A complement-fixation test or skin tests for gonorrhea are not recommended.

Smears

The laboratory diagnosis of acute gonorrhea in male patients may safely be made in the majority of cases on the basis of a positive smear; the method is less accurate in acute gonorrhea in the female. In chronic gonorrhea in both male and female, the smear method alone is unreliable, and the cultural method should be used in addition.

Cultures

The cultural method of diagnosis should consist of: growing of the gonococcus on a standard medium (Mueller's starch agar, Difco's proteose No. 3, chocolate agar, Peizer's medium, Thayer's medium and so forth); performance of oxidase test; and sugar fermentation reactions.

The taking of cultural specimens requires the careful attention of the physician. The ideal method is to obtain a specimen and streak it immediately on a solid medium. If this cannot be done, the inoculum should be dispersed in the transport medium and mailed to a central laboratory. The results with this latter method — other conditions being equal — varies directly with the interval between the taking of the specimen and its being placed on the cultural medium. If there is a delay of forty-eight hours before plating, indirect cultural methods are for all practical purposes worthless.

A smear should accompany every specimen that is to be cultured.

The Inoculum

In the male, the urethral discharge may be used as an inoculum. The prostatic and seminal vesicle strippings may also be used. However, urinary-sediment culture is the method of choice in the absence of urethral discharge in male patients. The first morning urine should be used.

In female patients, cervical cultures are preferred. A nonlubricated cervical speculum should be used for visualization of the cervix. The cervical mucus is removed with a dry applicator, and the cervix firmly squeezed with the blades of either a bivalve speculum or a pair of forceps. A sterile, dry applicator is then passed into the cervical canal, rubbed firmly against its walls and immediately streaked on the solid cultural medium or placed in the transport medium. Cultures should also be taken from the urethra after it has been stripped or from the orifices of Bartholin's gland if that structure is involved.

Follow-up Study

Each treated case of gonorrhea should be followed by smears and cultures until at least two smears and cultures taken at weekly intervals are negative. The patient should be asked to return on the third day after treatment, and smears and cultures should be taken at this time. Thereafter, they should be taken at weekly intervals. It is agreed that a standard serologic test for syphilis should be done when the patient *initially* reports to the clinic for diagnostic examination, *one week* after treatment, and thereafter at *monthly* intervals until *four months* have elapsed from the date of the last exposure, or until two consecutive blood tests taken at least a week apart are negative (whichever is later).

Contacts

If a history of a definite onset exists, the patient should be interviewed for all contacts within two weeks prior to the onset of symptoms and all contacts subsequent thereto.

If there is an indefinite history of onset or if symptoms are denied, the patient should be questioned for all contacts within the past month.

All contacts of gonorrhea should be reported directly to the Massachusetts Department of Public Health on the forms provided for this purpose.

Treatment

Uncomplicated gonorrhea. The treatment consists of 300,000 units of procaine penicillin in peanut oil with 2 per cent aluminum monostearate given intramuscularly in a single injection.

Failure to respond. When uncomplicated gonorrhea has been treated as above but the discharge has persisted for three days or more, or if the smear and culture is still positive for the gonococcus, the patient should be treated with 600,000 units of procaine penicillin in oil with 2 per cent aluminum monostearate in a single injection intramuscularly.

Complicated gonorrhea. The therapy should include 300,000 units of procaine penicillin in oil with 2 per cent aluminum monostearate daily for at least three days. The length of treatment will depend on the clinician's judgment.

Patients sensitive to the oil. Patients who may be sensitive to the oil may be treated with an aqueous solution of crystalline penicillin G as follows: 50,000 units of penicillin intramuscularly; 50,000 units at the end of the first hour; and 100,000 units at the end of the second hour.[1]

Alternative schedule. An aqueous solution of 300,000 units of procaine penicillin may be given intramuscularly in a single injection.

Patients sensitive to penicillin. Patients sensitive to penicillin should be treated with sulfathiazole or streptomycin. Sulfathiazole should be given in 1-gm. doses by mouth every four hours for four doses each day. Treatment should be continued for a period of five days.

Streptomycin may be given in doses of 40,000 units every four hours for three doses or in a single injection of 300,000 units (that is, 0.3 gm.) in saline solution intramuscularly.

Patients who are strongly suspected of having been exposed also to syphilis should be treated for their gonorrhea with sulfathiazole and not with penicillin to prevent masking of a possible syphilitic infection.

Mixed infections. Patients with gonorrhea and chancroid or those with gonorrhea and granuloma inguinale may be treated for both infections with streptomycin.

Vulvovaginitis. This condition should be treated with the drugs enumerated above. Estrogens should not be used in the treatment of gonorrheal vulvovaginitis.

Syphilis

The diagnosis of syphilis should be made as early as possible since a favorable outcome depends on how long the patient has had the disease before treatment.

Diagnostic Methods

A darkfield examination should be performed routinely on all genital lesions, particularly of the ulcerative type, and all suspicious secondary eruptions; the examination may be immediate or delayed. The immediate darkfield examination is the method of choice and is the only type recommended for general use. The success or failure of any darkfield examination depends considerably on the material to be examined. Therefore, to obtain a specimen for this important test, the base of the chancre should be grasped firmly and the surface cleaned with a wet saline sponge. Under moderate pressure, clear serum should be allowed to ooze forth. It may be necessary to abrade the surface of the chancre with dry gauze. A small amount of bleeding may result, and the blood should be wiped off with a dry sponge until clear serum appears. While the serum is being examined, the patient should receive a standard blood test for syphilis.

No genital lesion should be treated locally or otherwise until repeated darkfield examinations have been performed. Under no circumstances should an antiseptic be applied locally.

Physiologic saline dressings alone should be used pending darkfield examinations.

A single darkfield examination alone, if negative, is of no significance. It should be repeated again and again.

Latent Syphilis

Every patient should be carefully questioned for any signs or symptoms of acquired or congenital syphilis. Any condition that may give a false-positive blood test must be ruled out. The diagnosis of latent syphilis should not be made until a lumbar puncture has been performed. Therefore, all patients presenting themselves to the clinic with a positive standard serologic test should have a repeat blood test followed by a lumbar puncture. Lumbar punctures may be done in the outpatient department. The spinal fluid should be examined for cell count, globulin estimation, total protein and complement-fixation tests.

The Wassermann laboratory will perform, on request, on all positive spinal fluids quantitative serologic tests, globulin estimations and total protein determinations. Cell counts should be performed by the physician directly after the specimen has been taken. The normal cell count is 1 to 4 per cubic millimeter. The normal protein is 35 to 40 mg. per 100 cc. It must be remembered that a negative spinal-fluid serologic test does not necessarily rule out neurosyphilis.

Congenital Syphilis

The use of quantitative serologic tests attains its greatest value in assisting the physician in making a diagnosis of congenital syphilis. A mother treated

during pregnancy for syphilis may still have a positive standard serologic test for syphilis at term, and the problem of deciding whether or not congenital syphilis has been contracted will have to be decided if the baby has a positive serologic test at birth. It is proposed therefore that when such a situation arises in which the mother and the newborn infant have positive blood tests quantitative serologic tests be done on both mother and child and titers established; a repeat blood test be done on the third day and thereafter at weekly intervals up to one month to determine the serologic pattern of the child (the mother should be tested at weekly intervals for one month); and, after the first month, the baby be tested at two-week intervals up to the end of the third month. The mother should be followed as any other treated case of syphilis.

If this is a reagin transfer, the blood test should revert to negativity, usually by the second month and definitely by the third month. If the baby's blood test is positive at the end of three months, a diagnosis of syphilis either congenital or acquired should be entertained.

If the baby's serologic pattern is one of decreasing titers proceeding to negativity and if the serologic titers have always been lower or at the most equal to the month's reagin titer, the child may be considered nonsyphilitic at the end of three months provided it has negative blood serologic tests.

However, if the baby's reagin titer is significantly higher than the mother's, even though the baby's blood may temporarily revert to negativity, the baby if infected will show at some time before the twelfth week and usually by the eighth week increasing blood titers. The rise in titers is frequently accompanied by the onset of symptoms.

Whenever a patient has been treated for acquired syphilis during pregnancy and on birth the infant shows no evidence of congenital syphilis and a negative blood serologic test, the follow-up study of the infant should continue at two-week intervals for the first month and thereafter at monthly intervals until a minimum of three months' observation has been completed. If the test is still negative at the end of the three months, it is recommended that the infant be examined on the sixth, ninth and twelfth months.

The presence or absence of congenital syphilis, therefore, in a patient who is seen by the physician regularly should normally be established by the end of the third month. However, unusual conditions may necessitate a longer period of study.

Blood from the umbilical cord should not be used as a diagnostic criteria for congenital syphilis.

Whole-body x-ray films of the newborn infant should be taken on or about the fifteenth day.

The treatment of primary, secondary, latent syphilis and syphilis in pregnancy is as follows:

Drug	Dosage per Injection	Total Injections
Inpatient:		
Aqueous penicillin G	80,000 units every three hours	60 (4,800,000 units)
(*Alternative Schedule*)		
Aqueous penicillin G	80,000 units every three hours	60 (4,800,000 units)
Bismuth	0.2 gm. every other day intramuscularly	5 (1 gm.)
(*Alternative Schedule*)		
Aqueous penicillin G	80,000 units every three hours	60 (4,800,000 units)
Bismuth	0.2 gm. every other day intramuscularly	5 (1 gm.)
Mapharsen	0.04 to 0.06 gm. intravenously weekly	10 (0.4 to 0.6 gm.)
Ambulatory or office:		
Procaine penicillin G in oil with 2 per cent aluminum monostearate	600,000 units in a single injection daily	10 (6,000,000 units)
(*Alternative Schedule*)		
Procaine penicillin G in oil with 2 per cent aluminum monostearate	600,000 units in a single injection daily	8 (4,800,000 units)
Bismuth	0.2 gm. every other day intramuscularly	5 (1 gm.)
Mapharsen	0.04 to 0.06 gm. intravenously weekly	10 (0.4 to 0.6 gm.)

As an alternative schedule, the standard Army treatment, twenty-six-week arsenobismuth series may be given:

Week of Treatment	Injections of Arsenoxide*	Injections of Bismuth†
1	2 weekly	1 weekly
2	2 weekly	1 weekly
3	2 weekly	1 weekly
4	2 weekly	1 weekly
5	2 weekly	1 weekly
6	2 weekly	
7	2 weekly	
8	2 weekly	Omit bismuth
9	2 weekly	
10	2 weekly	
11		1 weekly
12		1 weekly
13	Omit arsenoxide	1 weekly
14		1 weekly
15		1 weekly
16		1 weekly
17	2 weekly	
18	2 weekly	
19	2 weekly	Omit bismuth
20	2 weekly	
21	2 weekly	
22	2 weekly	1 weekly
23	2 weekly	1 weekly
24	2 weekly	1 weekly
25	2 weekly	1 weekly
26	2 weekly	1 weekly
Totals	40	16

*Each injection consists of 0.04 to 0.06 gm. intravenously; clorarsen, dichlorophenarsine hydrochloride or mapharsen may be used.

†Each injection consists of 0.2 gm. intramuscularly.

The treatment schedules for various forms of syphilis are as follows:

Drug	Dosage per Injection	Total Injections
Early congenital syphilis:		
Aqueous penicillin G	100,000 units per pound of body weight divided into 60-100 doses every 3 hours	—
Late congenital syphilis:		
Treatment is the same as in acquired syphilis		
Interstitial keratitis — penicillin as in early syphilis accompanied by fever, unless contraindicated		
Late mucocutaneous manifestations:		
Treatment is the same as in early syphilis		
Other late manifestations except neurosyphilis:		
Patient prepared with bismuth therapy, 0.2 gm. weekly for ten doses, followed by penicillin		
Aqueous penicillin G	80,000 units every 3 hours q 3° for 60 doses.	
Procaine penicillin G in oil and so forth	600,000 units daily for 10 days.	
Neurosyphilis — asymptomatic, acute meningitis, chronic meningovascular, gumma		
Aqueous penicillin G	50,000 units every 3 hours	120 (6,000,000 units)
(*Alternative Schedule*):		
Aqueous penicillin G	100,000 units every 6 hours	60 (6,000,000 units)
Tabes, paresis, taboparesis, primary optic atrophy, congenital neurosyphilis and syphilitic nerve deafness:		
Aqueous penicillin G	50,000 units every 3 hours	120 minimum (6,000,000 units)
Clinical or serologic relapse, or both (other than neurorelapse):		
Double penicillin dosage Standard Army treatment		
Neurorelapse and failure to improve:		
Penicillin treatment repeated, accompanied by fever therapy unless contraindicated.		

Treatment of Arsenical Reactions

BAL (2,3-dimercaptopropanol) in oil,[2] containing 20 per cent benzyl benzoate, is indicated in the treatment of hemorrhagic encephalitis due to arsenotherapy, arsenical dermatitis, and possibly postarsenical jaundice, but not homologous serum jaundice following parenteral therapy. It is useful as an adjunct in the treatment of agranulocytosis due to arsenic, but other measures, principally massive doses of penicillin, must also be employed.

The toxicity of BAL appears to be less in patients suffering from arsenic poisoning, but doses of 300 mg. (5 mg. per kilogram of body weight) may produce nausea, vomiting and headache; a burning sensation of the lips, mouth, throat and eyes; generalized muscular aches, with burning and tingling of the extremities; and a sense of constriction in the chest. The symptoms usually subside in thirty to ninety minutes.

Dosage. In the treatment of arsenic poisoning, 3 mg. per kilogram of body weight should be given intramuscularly as follows: every four hours for the first two days; four injections on the third day; and injections twice daily thereafter for ten days, or until complete recovery. In milder cases the dose may be reduced to 2.5 mg. per kilogram of body weight.

Follow-up Study of Treated Syphilis

All patients treated for syphilis should have a two-year follow-up study. All syphilis except late syphilis should be followed at monthly intervals for one year, and at quarterly intervals during the second year. Each patient should receive a lumbar puncture between the sixth and the twelfth month after treatment. Late syphilis, because of individual variations and individual problems, should be followed at the discretion of the physician — that is, in uncomplicated neurosyphilis a follow-up study at intervals of three to six months may be used.

Contacts

Patients with primary syphilis should be questioned for contacts within three months prior to the onset of symptoms and subsequent thereto.

Patients with secondary syphilis should be questioned for contacts within six months prior to the appearance of the secondary manifestations and subsequent thereto.

Patients with early latent syphilis should be questioned for contacts within a one-year period. All marital and familial contacts should be checked as indicated.

For patients with late syphilis, marital and familial contacts should be examined.

With congenital syphilis, the parents and available siblings should be examined.

The problem will arise of patients who while on ambulatory treatment miss one or more day's treatment with procaine penicillin. If such a patient should lapse for only twenty-four hours, the rest of the procaine penicillin schedule should be continued. But if the patient should lapse for forty-eight hours or more, the procaine penicillin series should be begun over again.

Summary

With the able assistance of the Advisory Committee to the Division of Venereal Diseases, the Massachusetts Department of Public Health has adopted standards for the diagnosis, treatment and follow-up study of patients with gonorrhea and syphilis for use in the co-operating venereal-disease clinics.

The members of this Advisory Committee are the present chiefs or the recently retired heads of the venereal-disease co-operating clinics. They therefore reflect the most authoritative opinion in the field of venereal diseases in Massachusetts.

The name of each committee member and the clinic he represents are as follows:

Name	Hospital
Dr. Bernard Appel	Lynn Hospital, Lynn
Dr. Harvey Bianco	112 Main Street, North Adams
Dr. Leo Blacklow	Waltham Hospital, Waltham
Dr. Sarah H. Bowditch	Assistant director, Division of Venereal Diseases
Dr. George Bourgeois	Boston Dispensary, Boston
Dr. G. F. Clark	Lawrence Clinic, Lawrence
Dr. Lionel Cole	House of Mercy Hospital, Pittsfield
Dr. G. Marshall Crawford	Mt. Auburn Hospital, Cambridge
Dr. C. Robert Damiani	Worcester City Hospital, Worcester
Dr. Benjamin Ferris	Children's Medical Center, Boston
Dr. William L. Fleming	Massachusetts Memorial Hospitals, Boston
Dr. Chester M. Frazier	Massachusetts General Hospital, Boston
Dr. Joseph Goodman	Beth Israel Hospital, Boston
Dr. J. Hartwell Harrison	Peter Bent Brigham Hospital, Boston
Dr. William Hill	Massachusetts General Hospital, Boston
Dr. James Hitchcock	Burbank Hospital, Fitchburg
Dr. Lewis Kane	Boston Dispensary, Boston
Dr. Israel Kopp	Boston Psychopathic Hospital, Boston
Dr. C. Guy Lane	416 Marlborough Street, Boston
Dr. Harold L. Leland	Board of Health Clinic, Lowell
Dr. F. W. Marlow, Jr.	Peter Bent Brigham Hospital, Boston
Dr. T. Frank Marnell	312 Main Street, Great Barrington
Dr. Everett A. Merrill	Lynn Hospital, Lynn
Dr. Edward L. Merritt	Board of Health Clinic, Fall River
Dr. Joseph Muller	Memorial Hospital, Worcester
Dr. Paul Nathan	Holyoke Hospital, Holyoke
Dr. William W. Nelson	New Bedford Co-operating Clinic, New Bedford
Dr. Augustus S. Rose	Boston Psychopathic Hospital, Boston
Dr. Hyman Saphirstein	Beth Israel Hospital, Boston
Dr. Allen Sherman	Newton-Wellesley Hospital, Newton
Dr. John D. Shinberg	Board of Health Clinic, Haverhill
Dr. Harry C. Solomon	Boston Psychopathic Hospital, Boston
Dr. Edward C. Sullivan	Springfield Hospital, Springfield
Dr. Francis M. Thurmon	Boston Dispensary, Boston
Dr. Fred Weiner	Brockton Hospital, Brockton
Dr. L. Woodruff	Massachusetts General Hospital, Boston

Nicholas J. Fiumara, M.D., M.P.H.
Director, Division of Venereal Diseases

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1. Status of penicillin in treatment of syphilis. Syphilis Study Section, National Institute of Health, December 1, 1947.
2. New and Nonofficial Remedies. 2,3-dimercaptopropanol in oil (BAL in oil). *J. A. M. A.* 137:368, 1948.

MISCELLANY

NOTE

Dr. Franz Goldmann, associate professor of medical care at the Harvard School of Public Health, has been granted leave of absence from June through November, 1949, to serve as consultant to the Public Health Branch of the Civil Administration Division, Office of Military Government for Germany, under a project jointly sponsored by the Rockefeller Foundation and the American authority.

CORRESPONDENCE

BRITISH DOCTOR LOOKS AT MEDICINE

To the Editor: The following excerpt from a letter written by a former exchange medical student from England should prove of interest to the readers of the *Journal*:

I hope you will forgive me if I seem terribly political but I thought I would mention a few of my feelings about the Health Scheme since I think you may be interested. I think I can honestly say that this move in England has started people thinking in many other countries besides our own. I take one of the American medical journals, and each week I read with interest the comments that appear in the editorials upon the topic of nationalized and socialized medicine. Incidentally, one of the best analyses of the subject I have read recently was in the *New England Journal of Medicine*. Anyone would be very hard put to disagree with the basic principles of the scheme — namely, to try to provide medical care of reasonable standard to all people and to see that no one should be denied medical care because of poverty. But I think many people will disagree with the methods adopted to bring this about. Quite frankly, I feel that the British medical profession is to blame to a large degree. There do not appear to be the leaders of the caliber that is needed, and all through the negotiations I feel that the vast majority of the profession has been betrayed by the leaders. One saw this particularly in the hospitals. The seniors of the rank of "specialist" pleaded with the profession to withstand the demands of the Government, and then they themselves were the first ones to seek favor with the ministers and to secure the best positions. In many ways the change was inevitable. The cost of upkeep of a modern hospital, for instance, is a very considerable sum, and the voluntary institutions were falling into more and more debt. With the present setup the Government is the main force controlling the expenditure of the service, and hence with this there is a distinct tendency for the policies of medicine to be dictated from a series of White Hall desks. Check has been kept of everything, and so the number of forms that have to be completed is something quite phenomenal, particularly by the poor general practitioner, who has now become a sorting clerk. He can devote only about three minutes at the very most to each patient and so if he suspects that there is a serious illness present he has to refer the patient to the hospital and thus lose any real medical work or else he spends the three minutes with the patient completing forms to provide him with free spectacles or extra milk or even a free wig. Many people think this is a grand thing and trail along to the doctor to get something for nothing, little realizing that they are actually paying quite a lot for these "free" services. I am afraid that British medicine is going to slide a long way behind the standards of other countries, for there is just no stimulus at all to provide a good standard. Perhaps if there should be attempts to socialize American medicine you will see that the initiative comes from the doctors and not from the administrators.

I am afraid that this has been a rather jumbled account but perhaps you can make a little sense out of it.

James P. O'Hare, M.D.
Boston

BOOKS RECEIVED

The receipt of the following books is acknowledged, and this listing must be regarded as a sufficient return for the courtesy of the sender. Books that appear to be of particular interest will be reviewed as space permits. Additional information in regard to all listed books will be gladly furnished on request.

Fractures and Dislocations. For Practitioners. By Edwin O. Geckeler, M.D., fellow of the American College of Surgeons, the American Academy of Orthopaedic Surgeons and the American Association for the Surgery of Trauma and diplomate of the American Board of Orthopaedic Surgery. Fourth edition. 8°, cloth, 371 pp., 344 illustrations. Baltimore: Williams and Wilkins Company, 1948. $5.00.

The first edition of this short textbook for students and general practitioners was published in 1937. Dr. Geckeler has revised this fourth edition to bring it up to date since the third edition was issued in 1943. New methods of treatment have been included, and the experiences gained during the last war have been incorporated in the text. A good index concludes the volume. The illustrations and publishing are excellent. The author recommends the methods that he considers the simplest and most reliable. The book should prove useful to the persons for whom it was written.

Medical Research in France During the War (1939–1945). By Jean Hamburger, professeur agrégé à la Faculté de Médecine, Médecin des Hôpitaux de Paris; and Professeur Pasteur Vallery-Radot, member de l'Institut. 8°, paper, 306 pp., with illustrations. Paris: Éditions Médicales Flammarion, 1947.

This work comprises a number of articles on a variety of medical subjects written by French physicians and translated into English for the English-speaking world. It embodies the results of medical research carried on by French physicians during the German occupation in World War II. The idea for the book came to Professor Vallery-Radot during a trip to the United States a few weeks after France was liberated, and he collaborated with Dr. Hamburger in assembling the collection of reports. The book is well published and should be in all medical libraries.

Venous Thrombosis and Pulmonary Embolism. By Harold Neuhof, M.D., clinical professor of surgery, Columbia University College of Physicians and Surgeons, and consulting surgeon, Mount Sinai, Montefiore, Beth El and Hackensack, New Jersey, hospitals. 4°, cloth, 159 pp., New York: Grune and Stratton, 1948. $4.50.

This monograph is based on an intensive study of the subject for the purpose of working out a plan for the surgical management of pulmonary embolism. The text is divided into two parts: a discussion of the subject in its varying aspects, including the anticoagulant therapy with dicumarol and heparin; and a consideration of massive pulmonary embolism, based in part on a study of 88 fatal cases, and of etiology, diagnosis, prophylaxis and therapy (including embolectomy), and the mechanism of death. The author is convinced that the best results in these cases can be obtained by a special hospital team selected for the purpose. A bibliography and an index conclude the text. The monograph is well published and is recommended for all medical libraries and should prove valuable to physicians and surgeons interested in the subject.

Fielding H. Garrison: A biography. By Solomon R. Kagan, M.D. 8°, cloth, 104 pp., with 8 illustrations. Boston: Medico-Historical Press, 1948. $4.00.

This volume constitutes a supplement to the *Life and Letters of Fielding H. Garrison,* published by Dr. Kagan in 1938. It presents additional biographic material on the early life of Dr. Garrison and his family and his service with the Army Medical Library, in the Philippines and at Welch Medical Library in Baltimore. The text is embellished with a large number of letters. An adequate index concludes the volume. The book is well published and should be in all medical-history collections.

Essentials of Pathology. By Lawrence W. Smith, M.D.; and Edwin S. Gault, M.D., associate professor of pathology and bacteriology, Temple University School of Medicine. With a foreword by the late James Ewing, M.D., Memorial Hospital, New York City. Third edition. 4°, cloth, 764 pp., with 740 illustrations. Philadelphia: Blakiston Company, 1948. $12.00.

The first edition of this book was published in 1938. In this edition it has been revised and augmented with new material, and the text has been completely reset. Changes have been made in all the chapters, and some have been entirely rewritten. A large number of illustrative case histories have been inserted throughout the text. Likewise, the illustrations have been checked, some changes made, and sixty-one new figures added. A bibliography, arranged by chapters, and a good index conclude the volume. The type, printing and plate work are excellent. The book has been written primarily for students.

NOTICES

ANNOUNCEMENTS

Dr. Hyman Alford announces the opening of his office for the practice of pediatrics at 1775 Beacon Street, Brookline.

Dr. Robert A. Bolduc announces the opening of his office for the practice of general surgery at 180 Lincoln Street, Worcester.

MASSACHUSETTS PUBLIC HEALTH CONFERENCE AND NEW ENGLAND HEALTH INSTITUTE

The third annual meeting of the Massachusetts Public Health Conference and the New England Health Institute will be held at the University of Massachusetts, Amherst, from June 15–17.

INTERN PSYCHIATRIC AND SURGICAL RESIDENCIES

The United States Civil Service Commission has announced a medical-officer examination for rotating intern psychiatric resident and surgical resident positions in St. Elizabeths Hospital, Washington, D. C. The salaries for rotating interns are $2200 for the first year and $2400 for the second year; the salaries for psychiatric resident range from $2400 to $4100 a year, and those for surgical resident, from $3400 to $4150.

To qualify, applicants for the rotating intern positions must be third-year or fourth-year students in an approved medical school. Applicants for psychiatric resident and surgical resident positions must be graduates of a medical school with the degree of doctor of medicine, and must have completed a full year in an approved rotating internship. In addition to these requirements, applicants for appointment as surgical resident must have completed three full years as residents-in-training in surgery in an approved residency. No written test is required for this examination. The maximum age limit of thirty-five years is waived for persons entitled to veteran preference.

Further information and application forms may be obtained at most first-class and second-class post offices, from civil service regional offices or from the U. S. Civil Service Commission, Washington 25, D. C. Applications will be accepted by the Commission's Washington office until further notice.

CIVILIAN DOCTORS FOR PANAMA CANAL ZONE

Permanent appointments for physicians in the Civil Service now exist in the Panama Canal Medical Service. Owing to the high appeal of the health and living conditions in this tropical country, the number of appointments to be made is limited, and early applications are suggested, by the Panama Canal Office, from physicians who desire the opportunity for training and experience in tropical medicine under standard American living conditions.

Starting professional salaries are $5599 and $6540 a year, with free transportation to the Canal Zone provided for physicians, their families and household goods. In addition, doctors who receive appointments get two months paid vacation (including time lost by illness) and reduced fares on Panama Line passenger vessels.

Requirements for professional medical positions starting at $5599 are graduation from an approved medical school; license to practice medicine in a state; ability to pass a standard physical examination; and completion of one year's internship in a hospital approved by the American Medical Association.

Requirements for professional medical positions starting at $6540 are the same except that a minimum of three years of post-internship experience is required.

The Panama Canal Health Department operates several hospitals and a number of well equipped dispensaries offering excellent professional opportunities. The Health Department also maintains constant vigilance over the health conditions of the Canal Zone and the adjacent cities of Colon and Panama City.

Interested physicians should address their applications to the Chief of Office, The Panama Canal, Washington 25, D. C., or to the United States Civil Service Commission, Washington 25, D. C.

(Notices concluded on page xiii)